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STAFF APPRAISAL REPORT

KOREA

HIGHWAY SECTOR PROJECT

March 1, 1984

Transportation Division
Projects Department
East Asia and Pacific Regional Office

CURRENCY EQUIVALENTS

Currency Unit - Won (W)

US$1	=	W 800 (as of January 1, 1984)
US$1.25	=	W 1,000
US$1 million	=	W 800 million
US$1,250	=	W 1 million

FISCAL YEAR

January 1 - December 31

WEIGHTS AND MEASURES

1 meter (M)	=	3.2808 feet (ft)
1 kilometer (km)	=	0.62 mile (mi)
1 square kilometer (km^2)	=	0.3861 square miles (sq mi)
1 hectare (ha) = 0.01 km^2	=	2.4711 acres (ac)
1 kilogram (kg)	=	2.2046 pounds (lbs)
1 metric ton (m ton)	=	2,204.6226 pounds (lbs)
		1.1023 short tons (sh tons or 2,000 lbs)
		0.9842 long tons (lg ton or 2,240 lbs)

PRINCIPAL ABBREVIATIONS AND ACRONYMS USED

ADB	-	Asian Development Bank
ADT	-	Average Daily Traffic
BPR	-	Bureau of Public Roads
EPB	-	Economic Planning Board
ERR	-	Economic Rate of Return
FFYP	-	Fifth Five-Year Economic and Social Development Plan
GNP	-	Gross National Product
KHC	-	Korea Highway Corporation
KMPA	-	Korea Maritime and Port Administration
KNR	-	Korean National Railroad
MOC	-	Ministry of Construction
MOCI	-	Ministry of Commerce and Industry
MOER	-	Ministry of Energy and Resources
MOF	-	Ministry of Finance
MOHA	-	Ministry of Home Affairs
MOST	-	Ministry of Science and Technology
MOT	-	Ministry of Transport
VOC	-	Vehicle Operating Costs

KOREA

HIGHWAY SECTOR PROJECT

Table of Contents

This report has been prepared by B.P. Kennedy (Engineer) and A.F. Ballereau (Economist).

TABLES

Page No.

ANNEXES

CHARTS

MAP

KOREA

HIGHWAY SECTOR PROJECT

Loan and Project Summary

Borrower:	Republic of Korea
Amount:	$230.0 million equivalent, including the capitalized front-end fee.
Terms:	Repayable in 15 years with 3 years of grace, at the standard variable rate.
Project Description:	The basic objective of the project is to assist the Borrower to increase economic efficiency in Korea's highway sector through improvements in investment planning, transport regulation and pricing, and energy conservation. The loan funds would help finance a three-year time-slice of the highway investment program for the years 1984 through 1986 to meet the increasing traffic demand by improving and paving roads, improving highway maintenance, and reducing the traffic accident rate. To achieve these objectives, an Action Plan will be carried out as follows: (a) highway investment planning - to establish a system under which all highway construction and maintenance investments are planned and funded on an integrated and sound economic basis; (b) energy conservation - to expand and improve the effectiveness of a Government program to increase energy efficiency in the transport sector; (c) transport regulation and pricing - (i) to study the impact of the present regulatory system on the cost of transport services with a view to the identification and removal of unnecessary regulations; (ii) to study and identify the most appropriate method of apportioning highway costs among users; and (iii) to study the use of freight terminals to improve road transport efficiency. The proposed loan entails risk of delays in implementation of the Action Plan which would be reduced by quarterly reviews of progress. There are also some risks as to the carrying out of two studies under the Action Plan and the adequacy of budget support for the highway investment program. The risks regarding the studies will be reduced by the requirement that as a condition of loan effectiveness contractual arrangements satisfactory to the Bank be established with consultants for the conduct of the

studies on transport regulation and pricing. The risk resulting from any reduction in the highway investment program for budgetary reasons will be diminished by choosing high priority subprojects for financing under the project.

Program Cost:	Local	Foreign	Total /a
	($ million)		
Highway Investment Program (1984-1986)	800	805	1,605
Total Program Cost	800	805	1,605

Financing Plan:

World Bank Loans:			
Provincial and County Roads Project (Loan 2228-KO)	-	115	115
Highway Sector Project	-	230	230
Asian Development Bank:			
Fifth Highway Project	-	100 /b	100
Korean Government:	800	360	1,160
Total	800	805	1,605

	Bank FY	1984	1985	1986	1987
Estimated Disbursements:	Annual	50.0	70.0	60.0	50.0
	Cumulative	50.0	120.0	180.0	230.0

Staff Appraisal Report: No. 4728-KO

Map: No. 16730R1

/a Capital expenditures proposed for years 1984 through 1986 in constant 1983 prices. Total cost net of tax, estimated at about 10%, is US$1,440 million.

/b Includes an amount of $20 million of commercial bank cofinancing.

INTRODUCTION

The Government of the Republic of Korea has requested Bank Group assistance in the financing of its road investment program for the latter part of the Fifth Five-Year Plan Period. Bank Group support for the development of Korea's roads has been extended through five previous projects, starting with a First Highway Project (Loan 769-KO) in 1971. The proposed project would, however, be the first involvement on the basis of a Highway Sector Project and a major objective would be to increase efficiency in the highway sector in Korea. The issues related to this objective were identified by a recent transport sector review mission. The proposed project would also continue Bank support to the development and maintenance of the Korean road system.

The project was prepared by the Ministry of Construction (MOC), the Ministry of Home Affairs (MOHA), and Ministry of Transport (MOT). Pre-appraisal missions visited Korea in April/May 1983 and this report is based on the findings of appraisal missions comprising Messrs. B. P. Kennedy (Engineer) and A. F. Ballereau (Economist) which visited Korea in May and July 1983. A Transport Sector Issues Survey Report No. 4423-KO was issued on December 27, 1983.

I. TRANSPORT SECTOR

A. Geographic and Economic Setting

1.01 The Republic of Korea has a land area of 98,500 sq km. About 70% of the land area is mountainous and agriculture is confined to about 22,600 sq km, or 23% of the total area, mainly in the river valleys, lower hillsides and coastal plains. The climate is seasonal with very cold dry winters and hot humid summers. Annual rainfall averages 800 mm to 1,400 mm with about 60% falling between June and September. The land mass is drained by a well developed river system with seasonal variations in flow which give rise to frequent flooding. The rugged terrain, extensive river system and severe winter climate make the construction of transport facilities, particularly roads, difficult and costly.

1.02 The population is presently estimated at 40.0 million and growing at an annual rate of 1.7%. Population density is estimated at 388 per sq km of total area or 1,702 per sq km of agricultural land. Urban population is estimated to be growing at an annual rate of 4.6% and has increased from 40.7% of the total in 1970 to 55.9% in 1982. The increasing urban population has created significant transport demand in the areas around the cities and industrial centers and particularly in the Seoul greater metropolitan area.

1.03 Korea's export-led industrialization has been among the most successful examples of economic development in recent history. During 1962-78, real GNP grew by 10% p.a. and per capita income more than tripled in real terms. Coupled with industrialization and urbanization, major developments and changes in the transportation sector complemented and supported the transformation of Korea's economy. Passenger traffic tripled between 1964 and

1971 and tripled again by 1981; freight increased nine times and five times respectively during the same periods.

B. The Transport System

1.04 Throughout much of the past 20 years, the transport system has been strained by the demands of rapid growth and it has required massive public sector investments in transport infrastructure. The Government has been allocating regularly, since the beginning of the Second Plan in 1967, about one quarter of its total capital expenditure to expand and modernize transport infrastructure. Investments have been concentrated on the Seoul-Busan axis where most industrial development is taking place and on other corridors serving the northeastern and southeastern parts of Korea.

1.05 Substantial changes in the modal distribution of traffic are illustrated by traffic statistics for the 1961 to 1982 period (Tables 1.1 and 1.2). Freight traffic moving by rail, although showing growth in absolute terms, fell from 88% of total ton-km to 37%, while the road and coastal shipping shares increased from 8% to 36% and from 4% to 27%, respectively. For passenger traffic, the rail share of total passenger-km fell from 53% to 22% over the same period, while the road share increased from 45% to 75%. These changes reflect both the economic advantages of the various modes and the different growth rates experienced between industries served, as rail and coastal shipping increasingly were concentrated on long distances and bulk commodities while road transport handled the short distances and more general cargo. In addition, rapidly expanding personal consumption generated large increases in personal travel, further fueled by changes in consumption patterns. Road transport has been the main beneficiary of these increases.

1.06 The Government of Korea's (GOK) basic objective in the past has been to increase the capacity of the system in line with projected traffic growth and to avoid major bottlenecks. This objective has been largely achieved. The present system is reasonably balanced and there is little uneconomic allocation of traffic among the various modes. Investments in transportation have been linked to broader concerns in Korea's spatial and economic planning. For example, considerable efforts have been made to develop new industrial complexes in coastal areas, to take advantage of Korea's natural potential in harbors and to exploit low-cost coastal shipping while avoiding excessive congestion on road and rail. Similarly, in its efforts to ensure that appropriate development priorities were reflected in the allocation of scarce transportation means among the competing claims, the Government has maintained fairly tight regulations in the sector, with a restrictive licensing system and administered pricing for all transport activities. These tight regulations have not enhanced efficiency in transport. Korea's vehicle fleet has been kept small due to a policy of high taxation of cars and high prices for gasoline.

1.07 Large investments in transportation infrastructure have been complemented by a considerable effort to improve the efficiency of the transportation system, through the establishment and strengthening of institutions to plan, construct, maintain and operate the facilities and services. In the public sector, institutions such as the Korean National Railroad (KNR), the

Bureau of Public Roads (BPR) in the Ministry of Construction (MOC), the Korea Highway Corporation (KHC), and the Korea Maritime and Port Administration (KMPA) have been established or strengthened in many instances with increasing financial and managerial responsibility as semi-autonomous public corporations. In the private sector, a highly efficient contractor system has evolved for civil works which reflects both the insistence on competitive bidding in the award of contracts as a matter of policy, and the large volume of construction that has been carried out in Korea during the past 20 years. There are now some 500 firms capable of handling a broad range of public works. Furthermore, with Government encouragement, the major construction firms have successfully expanded their construction activities overseas.

1.08 Details on the last four Five-Year Investment Plans (1962-81) together with the Bank's involvement in the transport sector are given in Annex 1.

C. Transport Sector Objectives and Issues in the 1980s

1.09 Objectives. The Government's main goals for the transport sector as stated in the Fifth Five-Year Economic and Social Development Plan (FFYP) are to: (a) selectively increase transport capacity by modernizing equipment and optimizing investments in the sector; (b) enhance transport efficiency by improving intermodal traffic allocation and conserving energy; and (c) strengthen maintenance activities.

1.10 These FFYP goals are appropriate and timely. Recovery from the recession of 1979/81 is now in progress, but the growth rate of the economy in the medium-term is likely to be more modest than during the 1970s. The impact of these developments on the transportation sector is two-fold. On one side, the timing of investments needed to sustain further improvements in transport capacity and quality of service will be influenced by growth-induced traffic expansion. On the other side, the capacity of the public sector to finance the necessary upgrading and expansion of infrastructure and facilities in transportation may be sharply constrained by budgetary limitations.

1.11 Issues. A Bank transport sector mission reviewed the transport investments proposed in the FFYP and identified the policy and institutional issues impeding efficiency in the sector. The mission concluded (in the Transport Sector Issues Survey Report dated December 27, 1983) that, although most of the transport investments proposed under the Plan pursue development priorities which are appropriate, considerably more could be done to increase the productivity of existing facilities and equipment. It was clear to the mission that the increasingly complex traffic patterns and higher traffic densities, the growing requirements for maintenance of the expanded system, and the need to conserve energy, will call for even greater efforts to maximize efficiency and the use of scarce investment capital in this capital intensive sector. The mission identified three main areas requiring specific attention in the current more demanding economic environment: (a) planning, (b) regulation and pricing, and (c) energy conservation. The mission's recommendations, based on the analyses of those issues which hinder the efficiency in the Korean highway sector, are discussed in detail in Chapter III.

1.12 Overall Transport Investment Planning Despite considerable efforts, spatial planning of the transportation system is still hindered by generally inadequate interagency coordination, by comparatively limited expertise in planning and economic appraisal techniques, and by the limited capacity to undertake appropriate longer-term preinvestment studies. The World Bank's efforts to provide support and encouragement for these activities has met with mixed success. In 1970, the Government set up a Transport Planning Office in the Ministry of Transport (MOT) on the recommendation of a study financed under a Transport Technical Assistance Credit. The Government tried again, in 1975, to improve transport coordination through a Transport Coordination Committee (TCC) with representation from the various ministries most directly concerned. The TCC, however, has not, in practice, been able to carry out its responsibilities for the coordination of transport sector investment very satisfactorily. More effective mechanisms need to be worked out.

1.13 Internal mechanisms, procedures and criteria need to be established to ensure that investments and action programs proposed by the various responsible agencies in each mode are internally fully consistent. Furthermore, all modal plans should be reviewed and integrated to enable the most cost-effective transport solutions to be selected, drawing on the complementarity of each mode based on its comparative advantages or relative efficiency. A system for effective coordination could probably best be organized by the EPB because of its general planning responsibilities and level. In particular the EPB's project evaluation functions would need to be strengthened in order to systematize the comparison of investment alternatives between modes. At the same time, the objective of ensuring effective integrated planning can be advanced by having project studies focus on multimodal solutions as the means to satisfy transport demand for specific commodities or in specific geographic areas. This approach is now being followed with the multimodal transport studies in the Seoul-Busan Corridor, and the Gyeonggi (Seoul) Region. A similar approach would also be useful for transport needs of the Southeastern Industrial Belt. The institution of multidisciplinary study groups, guided by steering committees representing the agencies concerned, will demonstrate in practice the coordination concept and contribute to the development of suitable institutional mechanisms for overall transport coordination. To do this, more staff skills need to be upgraded through appropriate training. There is also a need to recruit experienced planners, transport economists, intermodal and program analysts, and transport operations specialists from post graduate students and the domestic research institutes. The planning issues in the highway sector, which will be addressed under the proposed project are discussed in Chapter III (paras. 3.01 and 3.02).

II. HIGHWAY SECTOR

A. The Network

2.01 The public road network totals about 87,000 km comprising 13,400 km of national roads, 9,700 km of provincial roads, 11,500 km of county roads and 52,400 km of village access roads (see Table 2.1). The national highways include 1,245 km of toll expressways. Road density at 0.9 km/sq km is

generally sufficient to serve transport needs, particularly as about 70% of the total land area is mountainous, but most of the network still needs improvement. Despite heavy investments in road improvements since 1967, only 64% of the national roads, 13% of the provincial roads, and 5% of the county roads are paved and a high level of investment will continue to be required to ensure an adequate level of service for growing traffic volumes.

B. Traffic

2.02 Road transport has grown rapidly over the last 15 years, not only in absolute terms but also in relation to other modes, particularly railways. Road freight traffic in ton-km grew twice as fast as all freight traffic, averaging 45% p.a. in 1967-71 and 13% p.a. in 1972-76 and 9% p.a. in 1977-81. The share of freight traffic by road is expected to continue increasing in the long-term although probably more gradually. Passenger traffic on highways also grew rapidly, at 15% p.a. in passenger-km in 1967-71, 14.1% in 1972-76 and 9.1% in 1977-81. In 1981 it amounted to nearly three quarters of the total with the remainder going by rail, a complete reversal of the situation in 1961.

2.03 While the growth of road traffic has been rapid, government policy has been to regulate and to restrain growth. The policies of heavy taxation on motor vehicles and high user charges (gasoline taxes) have been mentioned in para. 1.06. As a result, the motor vehicle fleet in Korea is still very small (Tables 2.2 and 2.3) when compared to other countries at similar levels of per capita income. Motor vehicle fuel consumption has grown in line with the growth of road traffic (Table 2.4). The dimensions and axle loads of vehicles are strictly controlled on the expressways to ensure compliance with the regulations on same, which are satisfactory, and this control is increasingly being extended to the rest of the network. However, because of the generally high proportion of trucks on the network, agreement was reached with Government at negotiations that the Government will ensure that the dimensions and axle loads of vehicles using the road network will not exceed those allowed under the regulations. Restrictive commercial vehicle licensing policies have also contributed to moderating traffic growth. These were somewhat relaxed following agreement under the Second Highway Project (Loan 956-KO). Further improvements are to be tested under the ongoing Provincial and County Roads Project (Ln. 2228-KO) with the introduction of unscheduled passenger transport services (mini-buses) in selected remote rural areas, where such services are now largely lacking due partly to the restrictive licensing system. The introduction of the services has been delayed. However, a plan for these services has now been agreed with the Government and implementation of this plan would be a condition of loan effectiveness.

C. Road Safety

2.04 A serious road accident problem exists in Korea. For reasons not fully understood, road fatalities were about 65 persons per 10,000 vehicles in use in 1982 - among the highest of a group of 34 countries for which comparable statistics are available. Research on road safety and its promotion are the responsibility of a Road Traffic Safety Association, linked to MOHA. A road safety expert has been made available under the ongoing Provincial and

County Roads Project to assist the Association in the collection and analysis of traffic accident data and in the preparation of a program for the reduction of accidents, which will be implemented under the proposed project.

D. Institutions

2.05 The organizational and functional responsibilities of national and local authorities for the various classes of the road network are divided among several institutions (Table 2.5). MOC (Chart 1) exercises its responsibility for expressways through a public corporation, KHC (Chart 2), and for the national roads through its own BPR (Chart 3). MOHA (Chart 4) is responsible, through the provinces, for the provincial roads and, through the counties, for the county roads.

2.06 MOHA was not directly involved in highway management until recently. A Road Development Section (Chart 5) was set up in September 1979 to be responsible for preparing and monitoring provincial and county road maintenance and the development of the county road network. To handle the implementation of the ongoing Provincial and County Roads Project and the increased road improvement and maintenance programs that are associated with it, certain organizational changes as well as staff increases are being made at central, provincial and county levels (Charts 6 and 7).

E. Planning and Financing

2.07 Transport planning, including road planning, is mostly done in the context of the 5-year plan with the latest Fifth Plan covering the period 1982-86. Planning of the national road system, including expressways, is done by the Planning Division of the BPR. MOHA has little capacity at present for planning and under the ongoing Provincial and County Roads Project this will be built up using the screening and selection methodologies prepared by consultants financed under the Fourth Highway Project (Ln. 1640-KO) and by training selected MOHA staff in road development planning and transport economics. This development needs to be accompanied by the establishment of a system for coordinating investment planning by MOC and MOHA for the various levels of the road system.

2.08 Local funding comes from various public sources. For the national roads, the general budget is the sole source of funds for development and maintenance; user charges on vehicle purchase and operation collected through fees and taxes, accrue to the general budget. By contrast, KHC is financially independent, getting its revenues from tolls, and is not required to pay all the capital costs of its roads. The revenues from tolls amounted to W 60 billion in 1981, and two thirds were from the Seoul-Busan Expressway. Nearly 80% was collected from buses and trucks which represented 70% of the traffic. About 50% of the toll revenues were spent on maintenance. The level of tolls is subject to review by the Economic Planning Board (EPB) and approval by Government. The local governments also have a separate financing system; a block grant of 13.27% of national revenues is allocated annually to MOHA by EPB, which for 1983 is estimated at W 791.4 billion compared to W 719.0 billion received in 1982. MOHA then allocates funds to local government for the provincial and county road improvement programs. In

addition, the provinces raise revenues through local taxes and receive subsidies from MOC mainly for the maintenance of national gravel roads. The varied funding treatment of the agencies makes coordination of planning difficult since two of the agencies, KHC and MOHA, are free from direct budget management controls while BPR is not. The EPB, through its Budget Bureau, exercises a budgetary control on transport investments proposed by each ministry, except those of KHC and MOHA, and has the authority to cut or defer projects if required. The weaknesses in intramodal planning for the highway sector are being dealt with under the proposed project (para. 3.01).

F. Design and Construction

2.09 MOC, through BPR, has the responsibility for design and construction of national roads including new expressways and those provincial roads whose construction is to be funded by MOC or external sources. Consultants are employed for the design of major road works and their work is handled under a study groups system comprising seconded BPR staff. MOHA has only recently become involved in major road design work in connection with the county road program and employs consultants for design under the same system of study groups used by MOC. Both MOC and MOHA employ mainly domestic consultants for supervision of construction. Korea has a strong well-developed engineering consulting industry, with some 30 firms which are fully competent in all aspects of engineering design but so far have developed a limited capacity in areas of transport economics, and preparation and implementation of road maintenance programs, although this capacity is growing. The participation of foreign firms in design and for the supervision of construction is limited to overall management and assistance with special problems. The domestic engineering consulting industry will continue to have a substantial involvement in consultant services to be provided under the proposed project.

2.10 Competitive bidding is the established method for awarding contracts and international competitive bidding (ICB) is used for contracts financed by external sources and for specialized construction work. This policy, combined with the large volume of construction works in Korea during the past ten years, has resulted in the development of a large, efficient and experienced contracting industry (para. 1.07). Because of the strong domestic contracting industry, foreign contractors have not been successful in obtaining work in Korea.

G. Maintenance

2.11 KHC is maintaining the expressway network to a high standard. It has an effective maintenance organization, well-trained and experienced staff, a large number of maintenance equipment units and adequate funding from tolls.

2.12 MOC's organization to maintain the national road network was established and strengthened during previous highway projects through the provision of technical assistance and road maintenance equipment and is now satisfactory. However, there is a need to introduce more modern management procedures for the maintenance of the paved road network to ensure more cost-effective maintenance. Asphaltic concrete overlays are now used extensively and in many cases where a less costly resealing would be adequate. The use of modern

techniques to ascertain the residual life of the pavement by deflection beams and the condition of the pavement by bumptometers would help in deciding whether overlays or reseals are needed. Technical assistance and maintenance equipment would be provided under the proposed project to introduce a paved road maintenance management system. The preparation and introduction of this new system during 1984 is included in the Action Plan for implementation under the proposed project (paras. 5.14, 5.15, 5.16 and Annex 2).

2.13 MOHA maintenance organizations at central, provincial and county levels are weak; no proper planning of work is done and the maintenance is unsatisfactory due to lack of funds, trained staff, equipment and materials. As a consequence, the condition of the provincial and county roads is generally poor. Little regravelling work has been done and what little has been done is unsatisfactory. Likewise, the paved sections of these roads require heavy patching and resurfacing. To address these problems, the Government, with Bank assistance, has had consultants (BCEOM, France) prepare a five-year 1983-87 maintenance program for the provincial and county road networks under the Fourth Highway Project (Loan 1640-KO). This program is now being implemented under the ongoing Provincial and County Roads Project (Loan 2228-KO). The MOHA central, provincial and county organizations dealing with roads are being strengthened under this project through the provision of technical assistance, training and road maintenance equipment; no additional program is proposed under this new project.

H. Past Highway Projects

2.14 Results of the three highway projects that have been completed are generally very satisfactory. A Project Performance Audit Report (PPAR) on the First Highway Project (Loan 769-KO), including the Transport Technical Assistance Credit (S4-KO) and on the Second Highway Project (Ln. 956-KO) was issued on June 25, 1980. The PPAR found that the physical components were completed ahead of schedule, with only slight cost increases, but with quality defects on some roads resulting from rapid execution needing correction after completion. The re-estimated economic rates of return (ERR) for the construction components exceeded appraisal estimates; 34% against 28% for the First Highway Project; and 30% against 26% for the Second Highway Project. The maintenance component included in the second project showed an audit return of 38% versus the appraisal estimate of 53%; this reduction was mainly due to delays in implementation and the consequent partial effectiveness of the program. The PPAR stressed the substantial contributions of the Bank supervision missions to the establishment of the BPR. A Project Completion Report (PCR) on the Third Highway Project (Ln. 1203-KO) was issued on April 30, 1982. The PCR found that civil works were completed on schedule with a cost increase of slightly more than 1%. The re-estimated ERRs for the project roads ranging from 15% to 53% exceeded the appraisal estimates of 12% to 35% due mainly to the rapid increases in actual traffic volumes. The project provided assistance in the future development of the national and provincial road network through a study which screened and ranked, in order of economic priority, the roads in the national and provincial road system. A major policy achievement was the formulation of Government policy on tolls through a Toll Road Study carried out under the project. Following increased budget allocations, the progress of the Fourth Highway Project (Loan 1640-KO) has improved dramati-

cally with all the road improvement and paving works completed in June 1983; some equipment procurement and staff training will continue until project completion in June 1984. The progress of the ongoing Provincial and County Roads Project (Loan 2228-KO) is generally on schedule.

III. ISSUES RELATED TO EFFICIENCY IN THE HIGHWAY SECTOR

A. Highway Investment Planning

3.01 Intramodal Planning. There is a need first to bring consistency to the road planning done by the various agencies under MOC and the planning done by provinces, counties, cities and "special cities"/1 under MOHA and by Seoul City. As an initial step, a study for integrating national, provincial and county road programs has been started under the ongoing Provincial and County Roads Project (Loan 2228-KO) which will define a system of technical criteria and institutional procedures to be applied in the future. Under the Action Plan, the Government would, by end-1984, establish the system identified in the above study, under which (a) all investments in the highway sector would be planned on an integrated basis; (b) evaluation criteria for highway investment proposals would be adopted; and (c) funds appropriated for each road agency would closely support the priorities given in the integrated road investment plan (paras. 5.14, 5.15, 5.16 and Annex 2).

3.02 Intermodal Planning. Under the Action Plan, the Government would by mid-1986 establish procedures for comparing investment alternatives between modes; to prepare for this, the Government would develop a program for upgrading the skills of EPB staff in planning and economic evaluation by strengthening the procedures and staff skills in the EPB (paras. 5.14, 5,15, 5.16 and Annex 2).

B. Regulation and Pricing

3.03 In 1982, there was in Korea a total of 1,685 private commercial trucking companies, 1,659 with area licences and 26 with route licences /2 operating some 63,000 trucks. Some 735 bus companies operated almost 33,000 buses, about 55% in urban areas, and some 1,900 companies operated about 53,100 taxis while another 24,400 were operated by owner-drivers. Commercial road transport is restricted through a licensing and tariff system, the main problem of which is that it tends to suppress effective competition in commercial road transport and fails to serve adequately the needs of the users. Table 3.1 gives details of the commercial licensing of road transport companies. Less restrictive regulations were introduced recently but reform has not yet gone far enough. This is evidenced by the low growth of the common carrier fleet, which grew from 15,100 trucks in 1967 to only 63,000 in 1982, while the private fleet grew from about 5,500 to almost 200,000 and is

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/1 Busan, Daegu, and Incheon.

/2 An "area" license authorizes service within a limited area, generally a province, and a "route" license authorizes service along a given route between points A and B.

now three times larger (Tables 3.2 and 3.3). A similar evolution is also noticeable for buses which are operated more and more by other private enterprises, schools, and farmers' cooperatives (despite subsidies offered by MOT in remote rural areas to open new bus services). The licensing of commercial operators seems to have worked to their advantage as they could share the market among themselves, being protected from newcomers. However, as the commercial services offered do not meet the transport users' needs, private users have started to operate their own trucks which are less efficient because they are generally smaller and very often under-used. Furthermore, the resulting shift in demand has caused the operating pattern of the trucking industry to feature a high proportion of empty backhauls and small average size trucks, with consequent higher consumption of fuel than needed.

3.04 The economic regulations governing road transport can be summarized as follows: (a) licenses for all bus operations and "route" trucking are issued only to enterprises having a minimum of 30 vehicles in cities and in rural counties; (b) quotas are imposed on the total number of vehicles in each province as well as service areas or routes; and (c) rates and fares are regulated for freight and passenger traffic./3

3.05 Among the most distorting regulations are probably those requiring a fleet of 30 vehicles minimum in urban and rural areas for both "route" trucking and all busing operations. These regulations make it difficult for newcomers to provide the competition needed to generate efficiency. The FFYP calls for further consolidation of passenger transport operating companies, up to 300 buses per company. This, however, would only make more difficult the entry of new companies. Unless freedom of entry is introduced, the reliance of shippers on commercial services is bound to continue to diminish while the private, less efficient fleet will keep growing. Other regulations prevent operators from adjusting bus size to actual demand, resulting in the underutilization of full-size buses, especially in rural areas; this rigidity is also reflected in the very small number of minibuses seen on the roads. Regulations also do not provide for the use of dual-purpose vehicles for both passengers and goods, a class of vehicle usefully employed in many countries.

3.06 With a view to identifying specific measures required to improve the situation, the Government has included in the Action Plan two studies (paras. 5.14, 5.15, 5.16 and Annex 2). One study would start by July 1, 1984 and be completed by March 31, 1985 and would assess the economic impact of current regulations in the trucking industry on the cost of transport services and on energy use and would identify and propose the removal of unnecessary regulations. The other study would start by February 1, 1985 and be completed by October 31, 1985 and would identify the potential for improving efficiency in road transport through the use of road and intermodal freight terminals.

/3 The minimum vehicle requirement for enterprises to obtain "area" licenses for trucking and taxis in counties was reduced from 10 to 5 subsequent to agreement under the Second Highway Project; this requirement can be waived when deemed necessary and was removed for pick-up vans and for taxis and "area" trucks operated by owner-operators.

During negotiations, agreement was reached with Government on terms of reference, funding and expertise needed for the studies. MOF and EPB strongly support such studies but some doubts remain with the regulatory agency, MOT, about its commitment to the study on the economic impact of regulations in the trucking industry mainly because of its past reluctance to deal with this particular issue. Therefore the hiring of consultants satisfactory to the Bank for the transport regulations study would be a condition of effectiveness for the proposed loan. It was also agreed during negotiations that, not later than April 30, 1985 for the study on the impact of regulation of the trucking industry and not later than November 30, 1985 for the study on freight terminals, the Government would furnish to the Bank for its review and comment the findings and recommendations of the studies and not later than July 30, 1985, for the regulation study and February 28, 1986 for the freight terminal study, the Government would exchange views with the Bank on the findings and recommendations of the studies and, thereafter, implement such recommendations as agreed between the Government and the Bank in accordance with satisfactory timetables.

3.07 The pricing of road transport services and setting of road user charges is normally based on one or more of the following objectives: (a) to cover the operators' costs in providing the services; (b) to ensure that the costs of using the existing roads are paid for by the road users; (c) to provide revenue for expanding the road system; and (d) to ensure that the costs of road transport do not distort the demand for road use in relation to the use of competing transport modes, such as railways or coastal shipping.

3.08 Although, in the aggregate, road user charges have been closely in line with road expenditures (para. 4.16), the current system only partly fulfills these objectives. The system of cross-subsidization which enables operators to support loss-making services out of the surpluses earned on profitable ones, does not allow operators to recover expenditures sustained in high cost operations, nor to expand their low cost operations. The costs of road use is generally met in the case of cars, but not in the case of heavy vehicles (trucks and buses) which are virtually untaxed. The Special Excise Tax on diesel oil (exclusive of VAT) is only 23 Won a liter (compared to 283 Won on a liter of gasoline) and many of the annual licensing fees do not apply to heavy vehicles./4 Therefore, the use of roads for transporting goods is stimulated at the expense of rail and coastal shipping.

3.09 The road user charges should be reviewed and adjusted to introduce a more neutral taxation system that promotes fair competition by appropriately charging for the cost of road infrastructure. A study will be carried out under the Action Plan to determine actual road costs, who pays for them, and how the contribution of each road user should be apportioned to better reflect the damage inflicted on the road by the users (paras. 5.14, 5.15, 5.16 and

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/4 Trucks and buses pay tolls for the use of expressways proportionally to the vehicle weight and not to axle load which is the main factor damaging road pavements. This system encourages freight vehicles to avoid the faster and safer expressways and to use the untolled national roads which are also therefore overloaded and damaged.

Annex 2). The study would begin by May 1, 1984 and would be completed by December 31, 1984./5 Terms of reference and expertise needed for the study have been agreed. In view of the importance of this study and the need to have it implemented in 1984, the hiring of consultants satisfactory to the Bank will be a condition of effectiveness for the proposed loan. It was also agreed at negotiations that, not later than January 31, 1985, the Government would furnish to the Bank for its review and comments, the findings and recommendations of the road user charges study and, not later than April 30, 1985, exchange views with the Bank on the findings and recommendations of the study and thereafter implement such recommendations as agreed between the Government and the Bank in accordance with a satisfactory timetable.

D. Energy Conservation

3.10 Energy is a key factor in development in Korea and massive petroleum imports are a major cause of Korea's balance of payment deficits. Actions under the structural adjustment loans (SALs), are seeking to limit demand through appropriate pricing policies, and also under the SALs, specific conservation measures have been taken with respect to the industrial and building sectors. While some efforts have been made to conserve energy in the transport sector, largely through measures which have kept down the growth of the private automobile fleet, the potential for saving, which is substantial, is far from being fully realized.

3.11 The proportion of energy used in the transport sector is considerably smaller in Korea than in most other countries of similar income levels. The sector nevertheless accounts for 18-20% of national petroleum consumption. Consumption in the sector is expected to grow as disposal income increases, due to the prospect of a very large increase in the number of automotive vehicles, particularly passenger cars, which in 1982 number about 305,000 as compared to 263,000 trucks, 66,000 buses, and 410,000 motorcycles. The continuing, and probably accelerating, growth of the vehicle fleet means that the sector's energy consumption is bound to increase rapidly. This prospect underlines the importance and timeliness of energy conservation for the sector. Road transport accounts for two-thirds of the total energy use in transport, and broadly speaking, fuel accounts for 15-30% of the total economic costs of operating an automotive vehicle, with the lower figure being representative for most types of heavier vehicles.

3.12 The response of road transport users to higher energy prices depends on what is technically feasible and on incentives for which government policy is particularly relevant. Road users, acting on their own, will change their driving habits but many potential sources of economy require actions by government, local transport or highway authorities, either by changing regul-

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/5 During negotiations for SAL II, it was also agreed that the Road User Charges Study would be carried out during 1984 under the proposed project since the Tax Bureau had indicated that it would like to review the outcome of the Study before deciding on revisions, if needed, to motor fuel excise taxes.

ations, altering taxes and duties, controlling congestion, or investing in infrastructure. Measures that ought to be considered include economical driving and operating methods; reducing traffic congestion by pricing; intensifying fleet use by raising the load factor of trucks through relaxing the taxation and licensing systems; producing energy-efficient vehicles through improved design and fleet renewal; and infrastructure improvement.

3.13 An improvement in the energy efficiency of road transport of some 30% over the next five years is technically and economically feasible in Korea by the use of more energy-efficient vehicles, changes in driving and maintenance methods and in the management of road freight vehicles. Potential savings range from US$150 to 200 million a year.

3.14 At least six different ministries (viz. MOT, MOC, MOHA, MOCI, MOST and MOER) are involved in improving the energy efficiency of the transport sector. MOER is responsible for defining general policies and strategies, MOST is responsible for the development of advanced technologies for automotive and other applications, and each individual ministry is responsible for actions within its sphere of authority. While there is a coordinating committee composed of the various ministers, major industries and energy producers, it is not clear how active a role the committee plays. However, it is clear that effective leadership and coordination with respect to conservation of energy is lacking at present in the sector.

3.15 The Government recognizes the need for better coordination and planning in the energy sector and by March 31, 1984, MOER will start effectively to coordinate, manage and monitor actions for conservation of energy use in the transport sector. In this connection, MOER would:

(a) require the agencies with responsibility in the sector to submit plans which would establish energy conservation policies and goals for the period 1984-86. Such plans would cover inter alia;

  (i) the promotion of energy efficiency in the bus and truck manufacturing industry;

  (ii) a technological assessment of the potential in Korea for installing appropriate fuel conservation devices and adopting appropriate techniques for trucks and locomotives;

  (iii) driver training and public information programs for motor vehicle and railroad operators; and

  (iv) the establishment of criteria and guidelines for the analysis of proposed investments by agencies in the transport sector to assess their impact on energy demand.

(b) In order to assist in the preparation of (a)(i) through (a)(iv) above, conduct studies, workshops and seminars with the assistance of experts as necessary.

(c) Monitor achievement of targets through periodic reviews.

(d) With assistance from other appropriate agencies and experts, to develop and maintain a program to train sufficient staff in government agencies concerned with transport in the techniques of energy conservation analysis as applied to the transport sector. A plan for such training would be prepared by July 1984, and the training program would commence by March 1985.

3.16 The Government would implement the actions described in paras. 3.01, 3.02, 3.06, 3.09 and 3.15 above in accordance with the Action Plan and related time schedules (paras. 5.14, 5.15, 5.16 and Annex 2). The indices for monitoring progress on the Action Plan are given in Annex 3, page 4.

IV. HIGHWAY SECTOR DEVELOPMENT PLAN (1982-86)

A. Background

4.01 The present transport system of Korea has evolved largely through the implementation of four transport plans from 1962-81. Annex 1 gives the physical achievements of the transport plans, including highways, assesses performance and describes the Bank's involvement.

4.02 The Fifth Five-Year Economic and Social Development Plan (FFYP) forecasts a GNP growth rate of 7.6% p.a. over the period 1982-86. In contrast to past transport policy that almost exclusively emphasized expanding capacity during periods of strong economic growth, the Government is now pursuing a policy calling for significant adjustments in the sector, by (a) selectively increasing capacity by modernizing equipment and optimizing investments; (b) enhancing efficiency by improving intermodal traffic allocation and conserving energy; and (c) strengthening maintenance activities.

B. Objectives

4.03 Similarly, the highway sector development plan prepared as part of the FFYP emphasizes that the protection of existing road facilities through adequate maintenance is now as important as building and improving new roads. It then gives policy directives for road transport which emphasize the need to:

(a) expand and widen expressways which are near some major urban areas;

(b) continue improving and paving national and major provincial roads and strengthen maintenance;

(c) increase and modernize the vehicle fleet and develop safety measures;

(d) improve the efficiency of road transport operators by expanding terminal facilities and encouraging larger-scale transport firms; and

(e) expand and improve the transportation network in remote areas to reach all villages with 100 or more households.

The policy directives are considered appropriate with the exception of that of encouraging large-scale transport firms; this matter has been discussed in para. 3.05.

C. Description

Overall Scope and Cost of the Plan

4.04 In the highway sector, passenger transport is expected to grow at 6.4% p.a. from 74 to 93 billion passenger-km from 1982 to 1986, with an average trip distance of about 8 km (Table 4.1). Freight transport is expected to grow faster at 7.5% p.a. from 5.7 to 8.1 billion ton-km over the same period, with an average distance of 47 km (Table 4.2). Those official forecasts appear reasonable, and are much lower than earlier faster growth rates. However, the forecasts apply only to common carriers, buses and trucks. If the private transport owned by industries, groups and individuals had been included, the forecasts would have been higher since the private fleet is growing faster than common carriers as noted earlier (para. 3.03).

4.05 Further, the increase in motorization, particularly of cars, as anticipated in EPB's forecasts will add to the demand for road facilities. The registered fleet is expected to double by 1986, of which over 50% would be cars. Whether these targets can be achieved depends to some extent on Government's policy for lowering taxes on vehicles and fuel.

4.06 The FFYP's overall investment for road transport, comprising public and private programs, amounts to W 3,720 billion (Table 4.3). The plans include expenditures for road works on the national network only, and for new vehicles, terminals and warehouses. Total capital and recurrent expenditures planned for the national roads, including expressways, would amount to W 1,285 billion at 1980 prices, or about US$2.1 billion and would be 25% higher than the W 1,030 billion spent in 1977-81 during the Fourth Plan period (Tables 4.4 and 4.5). The actual expenditures during the first four plans are given in Table 4.6. As a whole, the FFYP national road investment program appears very reasonable given the forecasted traffic increases of 40% and 37% in freight ton-km and passenger-km, respectively, over the period.

4.07 The maintenance budget for national roads has been increased and represents 15% of total expenditures on those roads, compared to 11%, 6% and 2% spent, respectively during the Fourth, Third and Second Plans. This additional provision of funds for maintenance is in line with Government's recognition of the importance of maintenance. Nevertheless, 57% of all maintenance expenditures in 1981 by MOC were spent by KHC on its network of 1,245 km, while 43% was spent on the 12,000 km national road network (Table 4.7). This imbalance can be explained partly by the higher traffic, higher standard and higher level of services provided on the KHC expressways, but also reflects the freedom that KHC has to dispose of funds collected

through tolls. The problem of coordinating the level of expenditures with the actual needs of the various road networks is discussed in para. 3.01.

4.08 The Transportation Sector Plan does not include the road improvements and paving being done by MOHA under the Provincial and County Roads Project (Loan 2228-KO) funded by the Bank, and the construction and improvement programs proposed by other local governments including massive road investments programmed in the Special Cities of Seoul, Busan, Daegu and Incheon. According to MOHA, this latter program under the FFYP amounts to W 1,220 billion at 1980 prices or US$2.0 billion, and is about equal to the national highways program for the same period. This is a large increase over the expenditures of W 835 billion in 1980 prices in the Fourth Plan (nearly US$1.4 billion) for road construction by the Special Cities, mainly in Seoul City. Road expenditures of W 1,040 billion are proposed by other local governments including provinces, counties and cities and represent a very substantial increase from the W 330 billion (at current prices or W 385 billion at 1980 prices) spent in the Fourth Plan.

Road Construction Program

4.09 Tables 4.8(a) and (b) give the proposed expenditures on the Highway Investment Plan in constant 1983 and current prices respectively. The proposed capital expenditures and the physical targets for completed road and bridgeworks are shown in Tables 4.9(a) and (b). MOC is proposing to complete about 183 km of new expressways, pave 1,693 km of national and 112 km of provincial roads, widen some 165.5 km of national roads to 4 lanes, improve about 51 km of national roads and construct 9.4 km of bridges over the plan period. MOHA is proposing to improve and pave some 1,270 km of provincial and 1,925 km of county roads over the plan period. New expressways included in the program are the 175 km Daegu-Gwangju expressway which is scheduled for completion in mid-1984 (discussed further in para. 4.18) and an 8.2 km extension of the Seoul-Busan expressway to alleviate very heavy congestion near Seoul. KHC's program comprises about 229.1 km of expressway widening including:

Widening from 4 lanes to 6 lanes	km
Seoul-Incheon:	23.4
Seoul-Suweon:	26.5
Widening from 2 lanes to 4 lanes	
Masan-Naese:	8.5
Daejon-Gwangju:	170.7
Total	229.1

With the possible exception of the Jeonju-Gwangju section of the Daejon-Gwangju expressway widening project which needs further study (para. 4.19), the proposed expressway widening investments are justified on economic grounds.

Maintenance Program

4.10 The recurrent expenditures proposed for the routine and periodic maintenance of the road network over the plan period are shown in Tables 4.8(a) and (b). The amounts proposed are considered adequate for effective maintenance and they reflect KHC's existing maintenance program for expressways and MOC's for the national road system. The need to improve MOC's paved road maintenance system was described in para. 2.12. The maintenance program includes the preparation by MOC, with technical assistance from consultants, of a modern paved road maintenance management system which, with the use of modern techniques and equipment, would enable MOC to more effectively and economically plan and implement the resealing or overlay of the paved national roads. The preparation and introduction of this new system during 1984 is included in the Action Plan (Annex 2). The proposed recurrent expenditures for the maintenance of provincial and county roads are based on the comprehensive maintenance program being implemented by MOHA. Agreement was confirmed with the Government during negotiations that the road system would be maintained in a satisfactory manner and, to this end, that the amounts proposed to be allocated in the budget by KHC, MOC and MOHA for road maintenance expenditures would generally be in line with the recurrent expenditures shown in the highway investment program (Tables 4.8(a) and (b). It was also agreed with Government during negotiations that the Government would, with respect to MOC, by July 30 of each year and with respect to MOHA, by November 15 of each year, furnish to the Bank for its review and comment the proposed amounts to be made available for road maintenance to MOC and MOHA for the following fiscal year.

D. Assessment

Institutional Capacity

4.11 MOC, with the assistance of consultants, has prepared and implemented similar road development and improvement plans during past five-year development plans and in June 1983, completed improvement and paving of 1,221 kms of national and provincial roads under the Fourth Highway Project (Loan 1640-KO). In view of its past performance and present state of preparedness, MOC should have no difficulty in meeting the physical completion targets set.

4.12 Even though it became actively involved in highway work only in late 1979, MOHA's performance since then has been impressive. MOHA, with assistance of consultants, is implementing the first phase of the county road development program for the improvement of 1,006 km of roads under the Provincial and County Roads Project (Ln. 2228-KO) and progress is good to date. Also under this project, through the comprehensive maintenance program, MOHA central, provincial and county organizations dealing with roads would be reorganized and strengthened through the recruitment and training of staff. Furthermore, during 1981 and 1982, MOHA completed the improvement and paving of about 600 km of provincial and county roads with local financing. The reorganized and strengthened MOHA is expected to be able to achieve its program for the five-year period.

4.13 KHC's program of widening some 229 km of existing expressways over the program period will present no difficulty with regard to the staff and facilities needed to organize the preparation and implementation of this work, but it will be difficult for them to finance the total program; this is discussed further in para. 4.15.

Financial Aspects

4.14 The highway investment program under the FFYP is to be funded from domestic and foreign sources. Foreign financing is provided essentially by the Asian Development Bank and the World Bank. The financing requirements to meet the capital expenditures of the actual highway investment plan (excluding city roads) amounts to W 2,020 billion at 1983 prices (equivalent to US$2.6 billion) for the 1982-86 period. In addition, recurrent expenditures concerning the highway sector are expected to amount to W 900 billion. While the current expenditures are traditionally financed from domestic funds (either from central or local government budgets) and have always been made available and even substantially increased to meet requirements for maintaining the expanding network, capital expenditures have been supported by foreign funds. For the Fifth Five-Year Plan's overall capital expenditures, the government's domestic resource mobilization will amount to W 1,640 billion equivalent or US$2.1 billion, with a foreign participation of W 380 billion or $480 million equivalent representing 19% of the total financing needs. For the remaining years under the FFYP, which will be covered under the proposed loan (i.e., 1984-86), the domestic financing requirement will amount to W 930 billion with a foreign participation of W 360 billion equivalent or US$445 million representing about 27% of the capital cost financing. This proportion is sound and reflects Korea's ability to cover most of the expenditures from its own resources. About 70% of the funding needs for the domestic share is covered by fuel tax revenues which have been increasing steadily mainly due to the increase of gasoline prices. Although the tax rate has recently been reduced, it is expected that the income from road user revenues will be maintained at high levels through increases in consumption and that no shortfall of funds will arise.

4.15 KHC's original plan for expressway widening under the FYYP was 173 km, but this was substantially expanded to 229 km. The present program would require W 250 billion, of which KHC is expected to cover W 106 billion from its own income. The gap of W 144 billion would require a government subsidy, an increase in toll rates or a combination of both. Due to current government budgetary constraints, it is unlikely that a subsidy would be granted. There is also some uncertainty as to the economic justification of some of the proposed work (para. 4.19). Some elements of KHC's program may, therefore, be delayed.

4.16 Road user charges have been closely in line with road expenditures. Between 1977 and 1980, revenues reached W 1,306 billion versus expenditures of W 1,369 billion (Table 4.10). However, there is a strong imbalance of contribution among users; commercial vehicles making most damage to the network are those contributing least. This problem is being addressed under the proposed project (para. 3.09). Taxation is particularly high on private cars, the main taxes being on acquisition (40-50% of the ex-factory

price) and usage (annually about 25-40% of "on the road" value). These amounted to about W 1,200,000 or US$1,500 and W 1,100,000 or US$1,400 respectively in 1983 for a small car. Taxes on heavy vehicles are more moderate, amounting to about 10% of total operating costs for trucks and buses used by common carriers, but are more substantial for those used by private owners. There is no axle-load tax. In addition, taxes on gasoline add up to around 150% of the ex-refinery price, while diesel fuel is taxed at only 20% (Table 4.11).

Economic Aspects

4.17 The highway investment program (Tables 4.8(a) and (b) and 4.9(a) and (b)) prepared by KHC, BPR and MOHA under the FFYP period 1982-86 has been reviewed in consultation with the agencies concerned. With the exception of the two expressway investments (one ongoing and the other proposed for 1984 through 1986) which are discussed further below (paras. 4.18 and 4.19), the overall investment program adequately reflects Government development objectives as outlined in the FFYP, the economic priorities in the sector, the increased emphasis on improvement of county roads and the maintenance of the road network. Parts of the program have already been implemented satisfactorily under the Fourth Highway Project (Loan 1640-KO) during 1982 and 1983 and are being implemented under the Provincial and County Roads Project (Loan 2228-KO) and under an ongoing Asian Development Bank financed project, approved in November 1982.

4.18 A two-lane expressway, the East-West 175 km Olympic highway between Daegu and Gwangju, was added at the end of the Fourth Plan to improve regional communication and construction started in late 1981 with completion due in mid-1984. The road crosses a remote, mountainous and sparsely populated area that is bypassed by an excellent two-lane expressway via Masan. A feasibility study by a local consultant indicated that optimal opening year was 1991, but unquantified benefits in addition to vehicle operating costs and time savings would justify opening five years earlier. There is considerable doubt about the additional development benefits that could be generated in this area by an expressway costing US$1.7 million per km (US$ 300 million total) compared to the improvement of the existing road at one-fourth this cost. However, given the large sunk costs, the most beneficial course of action at this stage would be completion of construction on the present schedule.

4.19 The widening from 2 to 4 lanes of the 91 km section Jeonju-Gwangju expressway has been included in the program after the adoption of the FFYP. A very rough economic analysis was prepared for this section which overestimates benefits in the earlier years of operation starting in 1986, and no first year benefit/cost ratio was calculated. Based on traffic projections which would exceed 9,000 vpd only in 1988 and which do not take into account the ongoing parallel double-tracking of the railway line between Iri and Gwangju, this investment also appears premature and the cost of 100 billion Won or US$135 million could have yielded higher returns in other high priority projects. It was agreed with the Bank that a detailed feasibility study would be carried out by KHC to define the most appropriate timing of this investment. The study, which started in October 1983, is expected to be completed in six months and it was agreed with Government during negotiations that the findings

of the feasibility study would be discussed with the Bank prior to commencement of construction.

V. BANK PARTICIPATION

A. Objectives

5.01 The Government's basic strategy in the transport sector has been to increase the system's capacity fast enough to support economic growth and avoid bottlenecks. The investment strategy is aimed at establishing a reasonably balanced system and limiting uneconomic allocation of traffic among the various modes. Moreover, to ensure that scarce transportation means appropriately meet development priorities, the Government has maintained fairly tight regulations in the sector. Strict licensing of operators in road transport and shipping, and administered pricing for all transport activities were introduced and are still enforced today. Korea discouraged motorization through a policy of high taxation of domestic cars and high prices for gasoline. To complement the large investments made to develop a basic transport infrastructure, the Government made a considerable effort to improve the efficiency of institutions responsible to plan, construct, maintain and operate the new facilities and services.

5.02 Despite rapid and substantial progress in the Korean transport sector, many needs remain to be met. The new and more demanding economic environment resulting from the worldwide recession and increased fuel costs requires the country to take a more prudent approach than before in developing its basic transport infrastructure so as to optimize the use of scarce investment capital in a very capital-intensive sector. The increasingly complex transport patterns, higher traffic densities, and the growing need to conserve energy and to maintain an expanded system call also for greater efforts than in the past to maximize efficiency of service. In particular, it will be crucial in the years ahead to improve transport planning mechanisms, relax regulation and pricing policies, and streamline transport agencies to make the sector's development more rational, its operations more efficient and its energy savings substantial.

5.03 The main justification for the proposed project is to help Government achieve the goals outlined in its FFYP by dealing directly with policy and institutional issues in the transport sector (Chapter III) and more specifically to make considerable headway in resolving issues related to investment planning, regulation and pricing and energy conservation in the highway sector.

5.04 The project would also help Government improve the road network to meet the increasing traffic demand, improve maintenance of paved national roads, and reduce the present high rate of road traffic accidents.

B. Description

5.05 The proposed Bank Loan of US$230 million would support a three-year time-slice of the highway investment program for the years 1984 through

1986. The total capital expenditures on ongoing and new commitments for this period in constant 1983 prices is estimated at about US$1,605 million or US$1,440 million excluding taxes and duties, with a foreign exchange component of about US$805 million. The following general apportionment of the Bank loan has been agreed although funds could be shifted from one category to another depending on the pattern of implementation:

	Bank Loan	
	US$ m	%
MOC		
Paving of national and provincial roads and maintenance equipment	120.0	52
MOHA		
Paving of provincial and county roads	100.0	43
MOHA/MOC/MOT		
Road Safety Program	2.0	1
MOER/MOT/MCI		
Workshops, seminars, training Studies & experts for energy conservation in transport	2.0	1
OTHER		
1. Study on Impact of Transport Regulation 2. Study on freight terminals 3. Study on road user charges 4. Preparation of road projects - feasibility & engineering 5. Technical Assistance to BPR for maintenance management 6. Supervision of construction 7. Detailed engineering for investments in Seoul-Busan corridor and Gyeonggi regional transport study	6.0	3
Total	230.0	100

5.06 Highway Construction. The improvement of the Korean network is still a major objective since only 30% of the country's national, provincial and country roads are paved which is a relatively small proportion compared to countries with similar or less GNP per capita (Malaysia with GNP per capita US$1,792 has some 86% of its peninsular network paved). During the period

from December 1977 to November 1981, a comprehensive study was carried out by MOC through consultants (BCEOM, France and 8 domestic consulting firms) financed under the Third Highway Project (Loan 1203-KO). The roads in the national and provincial networks were screened to identify feasible road improvements and technical and economic feasibility studies were done to establish the economic ranking of the roads proposed for improvement. The study has provided the basis for MOC's road improvement program over the period 1984 through 1986 and the expenditures proposed by MOC/BPR for these years would improve about 1,200 km of national roads and 51 km of provincial roads (Tables 4.9(a) and (b)). Of this total some 400 km would be improved under the ADB financed Fifth Highway Project and it is expected that the improvement of about 362 km would be financed under the proposed project with the balance of the improvement works for about 440 km being done with local funds. Table 5.1 shows the list of 362 km of roads for which Bank financing is expected to be made available and gives details of the classification, projected traffic, estimated costs and the results of the economic evaluation. Detailed designs with cost estimates, tender documents and updated economic evaluation were also done under the study. The design standards for the expressways, national, provincial and county roads are shown in Table 5.2 and are satisfactory.

5.07 As a first step in dealing with the rapid deterioration of the county road network, MOHA, with financing under the Fourth Highway Project (Loan 1640-KO), had consultants undertake a similar three-phased study on the county roads. Phase 1 consisted also of a preliminary screening of the 12,500 county road network based mainly on socio-economic criteria in order to prepare a long-term improvement plan. Phase II further refined the analysis of about 3,000 km of high priority roads identified in Phase I and identified about 2,000 km of county roads for improvement in a first five-year program. (In January 1981, MOHA also started the "1981 Local Road Paving Project" financed by local funds, which has since improved some 600 km of road, about 150 km of county roads and 450 km of provincial roads.) Phase III of the study prepared the detailed design tender documents and updated economic evaluations for 1,006 km of county roads; the improvement of these roads was included in the Provincial and County Roads Project approved December 30, 1982 and the improvement work is now well under way. Detailed design, tender documents and the economic evaluation of a further 1,000 km of road identified in the study is being prepared by consultants financed under Loan 2228-KO and should be ready by end-1984. The design standards (Table 5.2) for the road subprojects approved for financing under the proposed project could be changed only after consultation and agreement with the Bank; this was agreed with Government during negotiations.

5.08 Road Safety. The road safety component will be identified in a study being carried out under Loan 2228-KO: the result of this study should be known by early 1984 and the implementation of the road safety program would start by June 30, 1984.

5.09 Economic Evaluation. The components of MOC's Program that lend themselves to straight-forward economic analysis, i.e., new construction, rehabilitation and paving, make up 52% of the Program while those of MOHA's Program account for another 43%. For MOC's 362 km of roads, all preparation

studies have been completed since June 1983; cost estimates are based on detailed engineering and benefits, depending on the specific subproject, consist of savings in vehicle operating costs, maintenance cost savings, and diverted or generated traffic benefits whenever applicable. Time savings were not included in the base case but have been calculated as optional information. The vehicle operating cost savings were based on the terrain in which a particular subproject is located, the vehicle composition and traffic growth as established by a countrywide system of traffic counting stations supplemented by specific counts as needed. Economic rates of return are very high, ranging from 23 to 119%, and reflect the high priority of roads selected (Table 5.1). For MOHA's roads, the methodology to evaluate benefits will be the same as for MOC's roads. The minimum economic return for subprojects to be included in the Program is established at 12%. The broad geographic distribution of subprojects ensures that the benefits of road improvements would contribute to the balanced development objective of the Government.

5.10 The road maintenance components constitute a small fraction of the program but will help MOC to improve the effectiveness of road maintenance. The economic assessment of the other components to be financed under the proposed program and which account for 5%, is more complex and, by necessity, of a qualitative rather than a quantitative nature. Improved highway investment planning would reduce costs and assure complementarity of road investments with other modes; improved energy conservation would reduce import costs for fuel; and the three studies on: (i) the impact of transport regulations; (ii) the freight terminals; and (iii) road user charges would be instrumental in focussing Government transport policy toward the objective of increasing the efficiency of road transport. Some tangible progress is expected by the gradual liberalization of the trucking industry to stimulate more competition, by better management of freight transport through consolidation of loads at terminals and by fairer apportioning of the taxes to maintain and develop the road network.

5.11 The other technical assistance elements proposed under the project would help either in the implementation of the project (supervision) or in the preparation of future investments (studies). The quality control improvement of road works and the multimodal approach in project design are both well worth the continuing support of Bank financing in these areas.

5.12 Estimated Costs. Contracts for the 362 km of roads shown in Table 5.1 would be awarded in early 1984. Table 5.1 also gives the total estimated cost at W 147.5 billion at end 1983 prices or W 317 million per km (or US$400,000 equivalent per km) for paving and W 751 million per km (or US$950,000 equivalent per km) for widening. Costs, including 10% physical contingencies and price contingencies which are the same for foreign and local costs (1984:7.5%; 1985:7% and 6% thereafter), total W 180 billion or US$230 million equivalent. Taxes and duties amount to about W18 billion, US$23 million, or 10%. The costs are calculated on the basis of quantities resulting from the detailed design and the unit prices derived from the recently completed (June 1983) Fourth Highway Project. The foreign component of the cost estimate is estimated at about US$115 million or about 50% of the total estimated contract amount.

5.13 A total of 1,160 man-months of consultants time are estimated to be needed to provide the services outlined in para. 5.03; some 880 man-months would be provided by domestic consultants and the balance of 280 man-months provided by foreign consultants (para. 2.09). The average man-month cost of domestic consultant staff is about US$2,600 including travel and allowances; average man-month cost of expatriate consultant staff for all services is estimated at US$12,000 including salary and overhead, international travel and local allowances. Other costs include costs of vehicles, including fuel and maintenance, local office facilities, utilities and local support staff.

C. General Sector Conditions - Action Plan

5.14 It has been agreed with the Government that the various actions described in Chapter III above with respect to highway investment planning, energy conservation and transport regulation and pricing would form the basis of an Action Plan. Such a Plan is attached to a letter to the Bank from the Government which outlines Government's policy in the transport sector. Final agreement on the Action Plan and a related time schedule was confirmed at negotiations. A copy of the ministerial letter and Action Plan are given in Annex 2.

5.15 Implementation of the Action Plan would be a sector condition of the proposed project. Performance would be judged on the basis of progress of the overall Action Plan through quarterly reviews of progress and a comprehensive review in November 1984; indices for monitoring progress on the Action Plan are given in Annex 3, page 4. Subproject approval and disbursements could be stopped if the Bank judged that performance was inadequate.

5.16 Given the critical importance of the effective implementation of the Action Plan to the overall project and particularly the actions related to the studies, it would be a condition of effectiveness for the proposed loan that contracts satisfactory to the Bank be signed with consultants for the proposed studies on the economic impact of regulations in the trucking industry and on road user charges to be carried out under the Action Plan.

D. Conditions for Subprojects

5.17 Before committing funds for a road improvement or paving subproject, the Bank would require the following:

(a) completion of detailed engineering, including cost estimates in foreign and local currencies, contract drawings, specifications and bid documents acceptable to the Bank;

(b) a feasibility study, acceptable to the Bank, which would show an economic rate of return for each proposed road subproject of at least 12%;

(c) an implementation schedule and estimated disbursement schedule satisfactory to the Bank; and

(d) procurement by international competitive bidding (ICB) in accordance with Bank guidelines.

E. Procurement

5.18 The road paving and improvement works, estimated to cost about US$440 million, including contingencies, would be carried out through contracts awarded on the basis of ICB by prequalified firms in accordance with the Bank Guidelines for Procurement and with assistance from the consultants. Bidders will be allowed to bid for separate or groups of contracts depending on the value of works for which they are prequalified. Equipment estimated to cost about US$12.0 million, including contingencies, will be procured through contracts awarded after international competitive bidding, also in accordance with Bank Guidelines for Procurement; foreign bids will be evaluated on the c.i.f. (point of entry) cost, and local bids on the ex-factory cost, with a margin of preference of 15%, or the import duties and taxes, whichever is lower, allowed to domestic manufacturers. All bidding packages for civil works and equipment would be subject to the Bank's prior review of procurement documentation.

F. Implementation

5.19 Several ministries or agencies would implement the various components of the project. In MOC, BPR would be responsible for carrying out the construction, improvement or paving of national and those provincial roads financed by direct allocations from MOF. The Bureau of Planning in BPR would be responsible for all studies on these roads as well as the feasibility studies on the multi-modal projects and would continue to be responsible for the integrated planning for all roads initiated under the Provincial and County Roads Project. MOHA would be responsible for carrying out the paving of county and those provincial roads financed directly by MOHA funds and all the feasibility and engineering studies related to these subprojects. Based on past experience, no problems are anticipated with the acquisition of land for the right-of-way for the road improvement subproject. MOHA would also implement the Road Safety program through its affiliated agency the Road Traffic Safety Association. All the road maintenance and other equipment would be procured by the Office of Supply Republic of Korea (OSROK) the central government procurement agency. The project is expected to be completed by December 31, 1987.

5.20 It was agreed at appraisal that EPB would have overall responsibility for ensuring that the Action Plan related to the sector issues (Annex 2) is carried out. Agreement on EPB's responsibility for implementing the Action Plan and on its reporting was confirmed with Government at negotiations.

5.21 As in past projects, domestic and foreign consultants will assist the executing agencies, MOC and MOHA in preparing and supervising the contruction of the road subprojects. Domestic and foreign consultants will also assist in the studies on various transport sector issues (paras. 3.06 and 3.09). The mix of local and foreign consultants will depend largely on the capabilities available to the local consultants for the various services to be provided and on the amount of the foreign expertise needed. Agreement was

reached at negotiations on the terms of reference and related expertise needed for the services and that all consultants would be employed according to Bank guidelines.

G. Disbursements

5.22 Disbursements from the loan would be made against the following categories of expenditures:

(a) 50% of the total cost of road improvement;

(b) 100% of the foreign expenditures for directly imported road maintenance equipment or 100% of the local expenditures (ex-factory price) excluding identifiable taxes and duties, of locally manufactured equipment;

(c) 100% of the costs of foreign and local consulting services; and

(d) 100% of the costs of the overseas training of staff.

A schedule of estimated disbursements is given in Table 5.3. Comparison with a country profile is not very meaningful for a highway sector project since the loan funds would be disbursed against an expenditure program over the three year period 1984, 1985 and 1986 and therefore disbursements are expected to be completed by end-1987 as reflected in the schedule of estimated disbursements.

5.23 Loan disbursement will be made on the basis of unit-priced contracts for civil works and equipment. Interim certification of civil works completed and costed at unit rates in the contracts will be done by MOC and MOHA at central and provincial levels and the supervisory consultants. Extra works or variation orders to the contracts which would have the effect of increasing the contract amounts by more than 20% would be approved by the Bank before being issued; this was agreed with the Government during negotiations. Loan disbursements for training overseas will be made against the actual costs of travel, subsistence and tuition or training fees.

H. Auditing

5.24 The disbursement procedures will facilitate the auditing and accounting of the loan funds. The technical assistance team under the ongoing Provincial and County Road Project will introduce cost control systems and auditing and accounting procedures at MOHA central and local levels for all expenditures made for force account work on routine and periodic maintenance to be done by MOHA forces and financed from local funds.

5.25 MOC, MOHA, MOT, MOER and MOCI would maintain separate accounts for the project and have these accounts audited by independent auditors acceptable to the Bank. During negotiations, agreement was reached with Government that the audited accounts of MOC, MOHA, MOT,MOER and MOCI, prepared by an independent auditor, will be sent to the Bank for review within six months of the close of each fiscal year.

I. Progress Reporting and Monitoring

5.26 Agreement was reached with Government during negotiations on the progress reporting requirements for the project including the Action Plan. The reports would be submitted to the Bank each quarter commencing June 30, 1984 and would form the basis for reviews of progress including a comprehensive review in November 1984. Tables 4.8(a) and (b) and 4.9(a) and (b) give the targets in financial and physical terms for the Highway Investment Program and progress will be reported against these targets. Annex 3 gives the progress reporting requirements including the indices for monitoring the implementation of the Action Plan. Agreement was also reached with Government during negotiations on the preparation and submission by Government of a Project Completion Report not later than six months after the Loan closing date.

J. Environmental and Urban Aspects

5.27 The road improvement works will not cause any significant environmental problem. Government policy is to follow the existing road alignments to the extent technically and economically possible, to minimize the acquisition of land, particularly agricultural land. Road safety would be enhanced by the implementation of the recommendations of the road safety study and by improved alignment and the reduction of existing hazardous dust and mud by bituminous paving. Since the roads are mainly in the rural areas, the urban aspect of the project is not significant.

K. Assessment of Risk

5.28 The main objective of the proposed project is to make headway in resolving policy and institutional issues in the highway subsector (para. 5.03). An Action Plan incorporating the various actions on these issues and a related time schedule would be agreed at negotiations (para. 5.15). The actions described in the Action Plan are generally in line with Government liberalization policy and with the objectives outlined in the FFYP and are fully supported by MOF and EPB; MOER has also agreed to the proposed actions on energy conservation. Some doubts remain as to MOT's commitment to the study on the economic impact of transport regulations mainly because of its past reluctance to deal with this particular issue. To ensure that this study and the Road User Charge Study commence in 1984, it would be a condition of effectiveness for the proposed project that contractual arrangements satisfactory to the Bank would be established with consultants for the provision of services for the two studies. The risk of delays in the implementation of the Action Plan would be reduced by the condition described above and by the quarterly reviews of progress.

5.29 During the present period of budgetary constraints there is the possibility that a shortage of revenues may require a reduction in the expenditures proposed in the highway investment program. If this occurs the highway sector approach allows considerable flexibility in choosing subprojects for exclusion from the plan. Since the feasibility studies will determine the priority ranking in economic terms of the roads proposed to be improved, it

will be possible to reduce the program by deleting those roads with lower priority. Thus, in the event of budgetary constraints, the Highway Investment Plan can be revised to reflect high priority needs.

VI. AGREEMENTS REACHED AND RECOMMENDATIONS

6.01 During loan negotiations agreements were reached with Government on an Action Plan (Annex 2) and on the time schedules for implementation of the Action Plan (para. 5.14), which would include:

(a) the preparation and introduction by MOC of the new paved road maintenance management system (para. 2.12);

(b) the establishment of a system under which all investments in the highway subsector are planned on an integrated and sound economic basis with funds appropriated for each road agency closely supporting the priorities of the integrated road investment plan (para. 3.01);

(c) the strengthening of procedures under which road investment plans are reviewed to ensure their coordination with those for other modes (para. 3.02);

(d) the implementation of two studies: (i) to assess the economic impact of current trucking industry regulations on the cost of transport services and on energy use and to identify and propose the removal of unnecessary regulations; and (ii) to identify the potential for improving efficiency in road transport through the use of road and intermodal freight terminals (para. 3.06);

(e) the implementation of a study on road user charges to identify how best to apportion the cost of roads among the users (para. 3.09); and

(f) the implementation of actions related to conservation of energy in the transport sector (paras. 3.15 and 3.16).

6.02 Agreements were also reached with Government at negotiations on the following additional matters:

(a) Government would ensure that the dimensions and axle loads of vehicles using the road network will not exceed those allowed under the regulation (para. 2.03);

(b) the terms of reference, and expertise needed for the studies described in paras. 5.05 and 6.01(d) and (e) above and that the qualifications, experience and conditions of employment of all consultants and experts to be employed according to Bank Guidelines (paras. 3.06, 3.09 and 5.21);

(c) Government would furnish to the Bank for its review and comments, the findings and recommendations of the studies in respect of impact of trucking regulation, road and intermodal freight terminals and road user charges not later than April 30, 1985, November 30, 1985 and January 31, 1985, respectively, and exchange views on the findings and recommendations of these studies not later than July30, 1985, February 28, 1985, and April 30, 1985 respectively, and, thereafter, implement such recommendations as agreed between the Government and the Bank in accordance with satisfactory timetables (paras. 3.06 and 3.09);

(d) that the road system would be satisfactorily maintained and that the allocation for maintenance expenditures by KHC, BPR and MOHA to be in line with the recurrent expenditures proposed in the Highway Investment Program and that Government would with respect to MOC, by July 30 of each year and with respect to MOHA, by November 15 of each year, furnish to the Bank for its review and comment the proposed amounts to be made available to MOC and MOHA for road maintenance for the following fiscal year (Tables 4.8(a) and (b) and para. 4.10);

(e) the findings of a feasibility study on the Jeonju-Gwangju expressway widening project to be discussed with the Bank before construction work starts (para. 4.19);

(f) the design standards for the road subprojects approved for financing under the proposed project could be changed only after consultation with, and agreement by, the Bank (para. 5.07);

(g) the conditions for Bank financing of subprojects (para. 5.17(a), (b), and (c));

(h) the EPB to be responsible for overseeing implementation of the Action Plan (para. 5.20);

(i) extra works or variation orders to approved contracts for road subprojects which would have the effect of increasing the contract amounts by more than 20% to be sent to the Bank for approval before being issued (para. 5.23);

(j) Government to send to the Bank each year for review within six months of the close of the fiscal year the audit of project accounts of the MOC, MOHA, MOT, MOER and MOCI prepared by an independent auditor (para. 5.25);

(k) quarterly progress reporting and monitoring requirements for the proposed project including the Action Plan and a comprehensive review in late 1984 (paras. 5.15 and 5.26); and

(l) a Project Completion Report on the proposed project to be prepared and submitted by Government to the Bank not later than six months after loan closing date (para. 5.26).

6.03 Conditions of effectiveness for the proposed loan would be:

(a) the implementation of a plan to introduce and monitor the operation of unscheduled transport services (mini-buses) in selected remote rural areas (para. 2.03); and

(b) the establishment of contractual arrangements, satisfactory to the Bank, with consultants for the proposed studies on (i) the economic impact of regulations in the trucking industry and (ii) road user charges (para. 5.16).

6.04 With the above agreements and conditions, the proposed project is suitable for a Bank loan of US$230 million for a period of 15 years with a grace period of 3 years at standard variable rates.

KOREA

HIGHWAY SECTOR PROJECT

Growth Trend of Domestic Passenger Traffic (1961-82)
(Units: 1,000 Passengers; million pass-km)

	1961		1966		1962-66	1971		1967-71	1976		1972-76	1981		1977-81	1982	
	Traffic volume	% share	Traffic volume	% share	% increase	Traffic volume	% share	% increase	Traffic volume	% share	% increase	Traffic volume	% share	% increase	Traffic volume	% share
Passenger																
Railways																
Rail intercity	88,291	13.0	138,299	8.3	9.4	128,159	4.1	(1.5)	148,562	2.8	3.0	268,364	2.9	13.1	282,022	2.9
Seoul suburban	N.A.	-	N.A.	-	-	N.A.	-	-	100,107	1.9	-	172,765	1.9	10.7	161,548	1.6
Subtotal	88,291	13.0	138,299	8.3	9.4	128,159	4.1	(1.5)	248,669	4.7	14.2	441,129	4.8	12.2	443,570	4.5
Subway	-	-	-	-	-	-	-	-	33,914	0.6	-	88,326	1.0	21.1	89,298	0.9
Highways																
Intercity	N.A.	-	277,078	16.7	-	339,886	10.7	4.2	651,624	12.2	13.9	910,657	9.9	7.0	978,402	10.0
Urban	N.A.	-	1,234,480	74.6	-	2,684,343	85.0	16.8	4,399,359	82.4	10.4	7,772,473	84.2	12.0	8,280,850	84.5
Subtotal	586,864	86.4	1,511,558	91.3	20.8	3,024,229	95.7	14.9	5,050,983	94.6	10.8	8,683,130	94.1	11.4	9,259,252	94.5
Maritime	3,743	0.6	5,909	0.4	9.6	6,371	0.2	1.5	5,994	0.1	(1.2)	9,230	0.1	9.0	9,602	0.1
Aviation	62	-	192	-	25.4	1,105	-	44.8	795	-	(6.8)	1,555	-	14.4	1,844	-
Total	678,960	100.0	1,655,958	100.0	19.5	3,159,864	100.0	13.8	5,340,355	100.0	11.1	9,223,370	100.0	11.5	9,803,566	100.0
Pass-km																
Railways																
Rail intercity	5,372	53.0	8,665	42.5	10.0	8,750	27.1	0.2	12,441	21.2	7.3	16,552	18.2	5.8	15,838	16.5
Seoul suburban	N.A.	-	N.A.	-	-	N.A.	-	-	1,864	3.2	-	4,976	5.4	21.7	5,196	5.5
Subtotal	5,372	53.0	8,665	42.5	10.0	8,750	27.1	0.2	14,305	24.4	10.3	21,528	23.6	8.5	21,034	22.0
Subway	-	-	-	-	-	-	-	-	388	0.7	-	1,258	1.4	26.5	1,309	1.4
Highways																
Intercity	N.A.	-	N.A.	-	-	11,936	37.0	-	25,030	42.7	16.0	35,559	39.0	7.3	38,211	39.9
Urban	N.A.	-	N.A.	-	-	10,981	34.1	-	18,369	31.3	10.8	31,756	34.9	11.6	33,899	35.4
Subtotal	4,618	45.5	11,464	56.2	19.9	22,917	71.1	14.9	43,399	74.0	13.6	67,315	73.9	9.2	72,110	75.3
Maritime	136	1.3	196	1.0	7.6	256	0.8	5.5	249	0.4	(0.6)	480	0.5	14.0	610	0.6
Aviation	18	0.2	55	0.3	25.0	314	1.0	41.7	276	0.5	(2.6)	557	0.6	15.1	654	0.7
Total	10,144	100.0	20,380	100.0	15.0	32,237	100.0	9.6	58,617	100.0	12.7	91,138	100.0	9.2	95,717	100.0

Sources: (1) Fifth Five-Year Economic and Social Development Plan, Transportation Sector Plan - (1982-86), December 1981, Transportation Sector Sector Planning Task Force, MOT, Korea, pp. 2-3.
(2) Statistical Yearbook of Transportation - 1981, MOT, Korea, pp. 16-17, pp. 60-63, pp. 110-113.
(3) Statistical Yearbook of Transportation - 1973, MOT, Korea, pp. 76-77.
(4) Statistical Yearbook of Transportation - 1982, MOT, Korea, pp. 8-9.
(5) Mission to Korea.

KOREA

HIGHWAY SECTOR PROJECT

Growth Trend of Domestic Freight Traffic (1961-82)
(Units: 1,000 tons; million tons-km)

	1961		1966		1962-66	1971		1967-71	1976		1972-76	1981		1977-81	1982	
	Traffic volume	% share	Traffic volume	% share	% increase	Traffic volume	% share	% increase	Traffic volume	% share	% increase	Traffic volume	% share	% increase	Traffic volume	% share
Tonnage																
Railways	15,373	47.9	24,064	46.9	9.4	31,955	25.1	5.8	43,629	17.8	6.4	48,761	12.1	2.2	47,437	11.0
Highways																
Commercial	N.A.	-	N.A.	-	-	73,934	58.0	-	93,751	38.2	4.9	104,256	26.0	2.1	108,576	25.2
Private & gov't.	N.A.	-	N.A.	-	-	10,320	8.1	-	94,439	38.4	55.7	226,547	56.4	19.1	247,575	57.6
Subtotal	15,299	47.6	24,528	47.8	9.9	84,254	66.1	28.0	188,190	76.6	17.4	330,803	82.4	11.9	356,151	82.8
Maritime	1,442	4.5	2,686	5.3	13.2	11,263	8.8	33.2	13,829	5.6	4.2	22,206	5.5	9.9	26,454	6.2
Aviation	-	-	-	-	-	7	-	49.1	5	-	(5.7)	18	-	28.5	30	-
Total	32,114	100.0	51,278	100.0	9.8	127,479	100.0	20.0	245,653	100.0	5.2	401,788	100.0	10.3	430,072	100.0
Tons-km																
Railways	3,486	88.2	5,450	81.6	9.3	7,841	48.9	7.5	9,728	44.6	4.4	10,815	37.5	2.2	10,892	36.9
Highways																
Commercial	N.A.	-	N.A.	-	-	3,302	20.6	-	4,374	20.0	5.8	4,868	16.9	2.2	5,097	17.2
Private & gov't.	N.A.	-	N.A.	-	-	237	1.5	-	2,172	10.0	55.7	5,217	18.1	19.2	5,674	19.2
Subtotal	323	8.2	558	8.4	11.6	3,539	22.1	44.7	6,546	30.0	13.1	10,085	35.0	9.1	10,771	36.4
Maritime	141	3.6	672	10.0	36.7	4,653	29.0	50.2	5,533	25.4	3.5	7,927	27.5	7.5	7,881	26.7
Aviation	-	-	-	-	-	2	-	-	2	-	(2.5)	7	-	26.5	11	-
Total	3,950	100.0	6,680	100.0	11.1	16,035	100.0	19.1	21,809	100.0	6.4	28,834	100.0	5.8	29,555	100.0

Sources: (1) Fifth Five-Year Economic and Social Development Plan, Transportation Sector Plan - (1982-86), December 1981, Transportation Sector Planning Task Force, MOT, Korea, pp. 2-3.
(2) Statistical Yearbook of Transportation - 1981, MOT, Korea, pp. 111, 113, 155, 157.
(3) Statistical Yearbook of Transportation - 1973, MOT, Korea, pp. 76-77, 101.
(4) Statistical Yearbook of Transportation - 1982, MOT, Korea, pp. 10-11, 159, 161.
(5) Mission to Korea.

Table 1.2

KOREA

HIGHWAY SECTOR PROJECT

Public Roads Network (1962-82) /a
(Unit: km)

	National roads /b			Provincial roads			Gun roads			Special city roads			City roads			Total		
	Paved	Gravel	Total	Paved	Gravel	Total	Paved	Gravel	Total	Paved	Gravel	Total	Paved	Gravel	Total	Paved	Gravel	Grand total
First FYP																		
1962	857	4,886	5,743	73	10,470	10,543	-	-	n.a./c	-	-	-	345	10,539	10,884	1,275	25,894	27,169
1963	865	4,947	5,810	54	11,244	11,298	-	-	n.a.	8	55	63	515	10,329	10,845	1,443	26,573	28,016
1964	963	4,936	5,899	54	11,343	11,397	-	-	n.a.	27	36	63	515	10,270	10,785	1,558	26,587	28,145
1965	1,042	4,857	5,899	71	12,267	12,338	-	-	n.a.	27	36	63	486	9,359	9,843	1,627	26,517	28,145
1966	1,349	6,837	8,186	31	10,364	10,395	-	-	n.a.	345	1,517	1,862	208	13,824	14,033	1,934	32,542	34,476
Second FYP																		
1967	1,442	6,744	8,186	52	10,600	10,652	-	-	n.a.	353	1,464	1,817	244	13,900	14,144	2,092	32,708	34,799
1968	1,540	6,626	8,166	74	10,597	10,671	-	-	n.a.	303	1,247	1,650	354	32,294	14,535	2,200	32,750	34,949
1969	2,110	6,461	8,571	134	10,703	10,837	-	-	n.a.	452	2,293	2,744	427	14,590	15,016	2,970	34,199	37,169
1970	2,461	6,197	8,658	202	10,692	10,894	-	-	n.a.	724	4,751	5,476	477	14,739	15,216	3,864	36,681	40,244
1971	2,943	5,843	8,786	254	10,524	10,774	-	-	n.a.	1,934	3,728	5,662	658	29,494	15,413	5,789	34,846	40,635
Third FYP																		
1972	3,319	5,610	8,929	283	10,517	10,800	-	-	n.a.	2,464	4,022	6,487	703	15,949	16,652	6,769	36,099	42,867
1973	3,868	5,419	9,287	503	10,389	10,892	-	-	n.a.	2,633	3,904	6,537	816	16,049	16,865	7,820	35,761	43,581
1974	4,070	5,217	9,287	639	10,250	10,889	-	-	n.a.	2,911	3,698	6,609	1,019	16,372	17,392	8,640	35,538	44,179
1975	4,748	4,612	9,360	719	10,092	10,811	-	-	n.a.	3,377	3,389	6,767	1,155	16,812	17,967	10,000	34,906	44,905
1976	4,876	4,486	9,360	811	10,057	10,868	-	-	n.a.	3,880	3,419	7,291	1,347	16,648	17,995	10,912	34,602	45,514
Fourth FYP																		
1977	5,434	4,008	9,442	922	9,933	10,855	384	12,125	12,509	4,051	3,405	7,456	1,306	4,095	5,401	12,097	33,567	45,664
1978	6,200	3,257	9,457	998	9,821	10,819	442	12,061	12,503	4,537	3,220	7,657	1,468	4,051	5,519	13,544	32,411	45,955
1979	6,224	3,233	9,457	1,169	9,819	10,988	466	12,022	12,488	4,823	3,042	7,865	1,595	3,941	5,536	14,278	32,056	46,333
1980	6,772	2,685	9,457	1,385	9,636	11,021	564	11,948	12,512	5,035	2,903	7,939	1,844	4,179	6,023	15,599	31,352	46,950
1981/d	8,019	5,473	13,492	1,103	8,910	10,013	532	11,325	11,377	5,854	3,549	9,403	1,672	4,379	6,051	17,179	33,158	50,337
Fifth FYP																		
1982	8,643	4,833	13,476	1,285	8,720	10,005	597	10,848	11,445	6,186	3,296	9,482	2,571	6,956	9,527	19,283	34,653	53,936
	(64.1%)	(35.9%)	(100%)	(12.8%)	(87.2%)	(100%)	(5.2%)	(94.8%)	(100%)	(65.2%)	(34.8%)	(100%)	(27.0%)	(73.0%)	(100%)	(35.8%)	(64.2%)	(100%)

/a In addition there are village access roads of which 52,444 km had been constructed and improved under the Seamaul Movement at the end of 1980.
/b Includes roads under the jurisdiction of KHC, totalling 1,245 km in 1981.
/c Length not available (n.a.) before 1977 as city roads were tabulated jointly with gun roads. Length of gun roads in 1962 believed to have been about 10,000 km.
/d Road networks were reclassified during the early part of 1981.

Sources:
1. Statistical Yearbook of Transportation - 1973, MOT, Korea, pp. 112-113.
2. Statistical Yearbook of Transportation - 1981, MOT, Korea, pp. 166-167.
3. Statistical Yearbook of Transportation - 1982, MOT, Korea, pp. 170-171.
4. MOC and mission to Korea.

Table 2.2

KOREA

HIGHWAY SECTOR PROJECT

Registered Motor Vehicles (1962-82)

Years	Cars/a	Trucks/b	Buses/c	Motorcycles	Others/d	Total
First FYP						
1962	8,733	13,093	6,747	1,846	395	30,814
1963	9,569	13,929	8,132	2,029	569	34,228
1964	11,409	14,951	8,617	2,158	678	37,813
1965	13,001	16,015	9,316	2,385	794	41,511
1966	17,502	19,432	10,888	1,322	1,016	50,160
Second FYP						
1967	23,235	22,955	11,499	1,722	1,286	60,697
1968	33,112	31,582	12,786	2,188	1,283	80,951
1969	50,299	40,134	14,237	2,531	1,468	108,669
1970	60,677	48,901	15,831	2,865	1,097	129,371
1971	67,582	53,405	17,411	4,068	1,871	144,337
Third FYP						
1972	70,244	55,116	17,550	4,297	2,727	149,934
1973	78,334	64,584	18,871	5,407	3,518	170,714
1974	76,462	76,833	20,060	6,039	4,150	183,544
1975	84,212	82,862	21,818	6,594	5,035	200,521
1976	96,099	93,885	23,643	7,342	5,351	226,320
Fourth FYP						
1977	125,613	118,150	26,710	7,440	4,839	282,752
1978	184,886	161,886	30,597	12,020	7,167	696,556
1979	241,422	206,822	37,697	181,976	8,437	676,354
1980	249,102	226,940	42,463	216,498	9,224	744,227
1981	267,605	243,828	50,595	276,335	9,726	848,089
Fifth FYP						
1982	305,811	263,939	66,326	410,286	10,920	1,057,282
			Average Annual Growth (% p.a.)			
1962-67	21.6	11.9	11.3	-	26.6	14.5
1967-72	24.8	19.1	8.8	20.1	16.2	19.8
1972-77	12.3	16.5	8.8	11.6	12.2	13.5
1977-82	19.5	17.4	20.0	223.0	17.7	30.2
			Fleet Composition (%)			
1962	28.3	42.5	21.9	6.0	1.3	100
1967	38.3	37.8	18.9	2.9	2.1	100
1972	46.8	36.8	11.7	2.9	1.8	100
1977	44.4	41.8	9.5	2.6	1.7	100
1982	28.9	25.0	6.3	38.8	1.1	100

/a Includes taxis and Government vehicles.
/b Includes public carriers as well as private and government-owned trucks.
/c Includes microbuses.
/d Public service and special vehicles.

Sources: (1) Statistical Yearbook of Transportation - 1973, MOT, Korea, pp. 102-105.
(2) Statistical Yearbook of Transportation - 1982, MOT, Korea, pp. 164-167.
(3) Mission to Korea.

Table 2.3

KOREA

HIGHWAY SECTOR PROJECT

Korean Motor Vehicle Production (1962-81)

Year	Cars	Buses	Trucks	Motorcycles	Total
Actual					
First FYP					
1962	991	42	884	-	1,917
1963	1,430	233	143	-	1,806
1964	179	405	108	343	1,035
1965	166	1,251	965	507	2,889
1966	3,398	1,482	559	1,461	6,900
Second FYP					
1967	5,033	941	1,512	4,635	12,121
1968	11,421	1,632	5,212	17,374	35,639
1969	19,727	1,884	9,626	13,735	44,972
1970	13,636	3,690	13,032	16,242	46,600
1971	11,870	3,059	8,072	12,317	35,318
Third FYP					
1972	9,952	2,581	6,115	9,012	27,660
1973	12,751	3,494	9,979	13,851	40,075
1974	9,069	3,945	17,276	11,495	41,785
1975	18,570	3,808	14,913	11,665	49,016
1976	26,701	3,468	19,219	16,798	66,186
Fourth FYP					
1977	43,981	5,453	35,263	32,629	117,326
1978	86,823	7,279	63,446	70,654	228,202
1979	113,564	12,307	76,661	100,496	303,028
1980	57,225	12,053	51,660	110,773	231,711
1981	68,760	13,358	52,166	123,521	257,805
		Average Annual Growth Rate (%)			
1972-76	34.6	16.1	42.0	29.3	33.5
1977-81	20.8	30.9	30.0	49.0	31.6

Source: (1) Statistical Yearbook of Transportation-1973, MOT, Korea, p. 115
(2) Statistical Yearbook of Transportation-1982, MOT, Korea, p. 173
(3) Mission to Korea.

Table 2.4

KOREA

HIGHWAY SECTOR PROJECT

Motor Vehicle Fuel Consumption (1962-82) /a
('000 Kiloliters)

Year	Gasoline	Diesel
First FYP		
1962	108	307
1963	97	358
1964	102	386
1965	223	507
1966	336	558
Second FYP		
1967	481	765
1968	573	1,251
1969	748	1,507
1970	865	1,775
1971	992	2,099
Third FYP		
1972	976	2,338
1973	1,040	2,838
1974	698	2,918
1975	664	3,328
1976	838	4,103
Fourth FYP /b		
1977	642	1,687
1978	962	2,065
1979	1,160	2,426
1980 /c	915	2,592
1981	771	2,861
Fifth FYP		
1982	551	2,814
	Average Annual Growth (% p.a.)	
1962-67	34.8	20.0
1967-72	15.2	25.4
1972-77	2.5	15.3
1977-81	-4.7	14.1

/a Gasoline consumption is totally for vehicles, but diesel consumption includes 20-30% of other consumption.
/b Gasoline and diesel consumptions correspond only to motor vehicle consumption.
/c Figures from computer data.

Source: Ministry of Commerce and Industry and mission to Korea.

Table 2.5

KOREA

HIGHWAY SECTOR PROJECT

Road Authorities and Agencies

	Toll highways	National roads	Provincial roads /a	City/county (gun) roads
Planning	MOC	MOC	9 provincial construction bureaus (PCB) /b	City/county construction divisions (CCD)
Construction				
Design & supervision	MOC/Korea Highway Corp. (KHC)	MOC through its 5 regional construction offices (RCOs)	PCB /b	CCD
Financing	MOC/KHC /c	MOC	Provinces with Ministry of Home Affairs (MOHA) grants; also from MOC budget for special projects	City/county with provincial grants
Maintenance				
Execution Authority/ Agency				
Paved	KHC	NHMO /d	PCB	CCD
Unpaved	-	PCB /d	PCB	CCD
Financing	KHC	MOC	Provinces with MOHA grants	City/county with provincial grants

/a The special cities of Seoul and Busan (city construction bureaus) have functions similar to provincial authorities (provincial construction bureaus).

/b MOC has so far handled the planning, design and supervision of construction or major improvement of a number of provincial roads, particularly those for which external financing is involved.

/c KHC was established in January 1969, but has not so far financed any construction.

/d MOC has responsibility for maintenance of all national roads; it directly maintains paved national roads through its 19 national highway maintenance offices (NHMOs) under its five regional construction offices (RCOs); it delegates maintenance of the unpaved national roads to the provinces (PCBs) with financial grants from MOC's budget, and assistance provided by its TCMOs.

Source: Ministry of Construction.

October 1982

Table 3.1

KOREA

HIGHWAY SECTOR PROJECT

Commercial Licensing of Road Transport Companies (1974-82)

Year	Taxis			
	Number of companies	Number of vehicles	Owners-drivers	Total taxis
1974	669	28,906	652	29,558
1976	711	29,104	856	29,960
1977	722	29,830	4,773	34,603
1980	1,517	53,588	15,958	69,546
1981	1,881	51,951	19,163	71,114
1982	1,932	53,153	24,435	77,588

Year	Trucks					
	Area license		Route license		Total	
	Number of companies	Trucks ('000)	Number of companies	Trucks ('000)	Number of companies	Trucks ('000)
1974	839	39.2	30	1.9	869	41.1
1976	889	37.0	32	1.6	921	38.6
1977	1,029	40.6	32	1.6	1,061	42.2
1980	1,245	56.9	30	1.9	1,275	58.8
1981	1,415	57.3	29	1.9	1,444	59.2
1982	1,659	61.4	26	1.4	1,685	62.8

Year	Buses							
	Intracity		Intercity /a		Charter		Total	
	Number of co.	Buses ('000)	Number of co.	Buses ('000)	Number of co.	Buses ('000)	Number of co.	Buses ('000)
1974	n.a.	n.a.	n.a.	n.a.	80	1.0	341	16.5
1976	199	9.5	144	8.7	93	1.3	436	19.5
1977	204	10.2	150	9.5	108	1.9	462	21.6
1980	336	15.4	161	11.2	153	2.8	650	29.4
1981	359	16.9	177	11.2	171	3.1	707	31.2
1982	376	18.3	177	11.4	182	3.3	735	33.0

/a Includes companies operating services on the expressways (12, 11 and 10 in 1974, 1977 and 1980).

Sources: (1) Statistical Yearbook of Transportation - 1982, MOT, Korea, pp. 162-163, 168.

(2) MOT and mission to Korea.

Table 3.2

KOREA

HIGHWAY SECTOR PROJECT

Trucks by Categories of Ownership (1967-82)
('000 vehicles)

Years	Government	Private/a	Commercial/b	Total
Second FYP				
1967	2.2	5.6	15.1	22.9
1968	2.7	7.6	21.3	31.6
1969	2.8	11.0	26.3	40.1
1970	3.0	15.2	30.7	48.9
1971	3.3	18.5	31.6	53.4
Third FYP				
1972	3.6	21.5	30.0	55.1
1973	4.9	26.8	32.9	64.6
1974	4.9	45.3	36.6	76.8
1975	5.0	39.9	38.0	82.9
1976	5.9	49.4	38.6	93.9
Fourth FYP				
1977	7.3	69.5	41.4	118.2
1978	7.6	105.4	48.9	161.9
1979	8.3	146.2	52.3	206.8
1980	8.9	165.4	52.6	226.9
1981	9.2	180.6	54.0	243.8
Fifth FYP				
1982	9.1	199.2	55.6	263.9
		Fleet Composition (%)		
1967	9.6	24.5	65.9	100
1972	6.5	39.0	54.5	100
1977	6.2	58.8	35.0	100
1982	3.4	75.5	21.1	100

/a For carrying own goods.
/b Common carriers.

Source: (1) Statistical Yearbook of Transportation-1976, MOT, Korea, p. 123.
(2) Statistical Yearbook of Transportation-1982, MOT, Korea, p. 166.
(3) Mission to Korea.

Table 3.3

KOREA

HIGHWAY SECTOR PROJECT

Cars by Categories of Ownership (1967-82)
('000 vehicles)

Years	Government	Private	Commercial (mostly taxis)	Total
Second FYP				
1967	2.2	9.9	11.1	23.2
1968	2.8	14.4	15.9	33.1
1969	3.1	23.7	23.5	50.3
1970	3.6	28.7	28.4	60.7
1971	4.0	34.0	29.6	67.6
Third FYP				
1972	4.5	36.4	29.3	70.2
1973	5.0	43.4	29.9	78.3
1974	4.9	44.6	27.0	76.5
1975	5.0	50.1	29.1	84.2
1976	5.2	61.6	29.3	96.1
Fourth FYP				
1977	5.7	85.1	34.8	125.6
1978	6.1	128.8	50.0	184.9
1979	6.8	172.9	61.7	241.4
1980	7.8	178.5	62.8	249.1
1981	7.9	193.5	66.2	267.6
Fifth FYP				
1982	7.8	225.6	72.4	305.8
	Fleet Composition (%)			
1967	9.5	42.7	47.8	100
1972	6.4	51.9	41.7	100
1977	4.5	67.8	27.7	100
1982	2.6	73.8	23.8	100

Cars per 1,000 Population

	Population (million)	Private ('000)	Total ('000)
1967	30.1	0.33	0.77
1972	33.5	1.09	2.10
1977	36.4	2.34	3.45
1982	39.3	5.74	7.78

Source: (1) Handbook of Korean Economy-1980, EPB, Korea, p.395.
(2) Statistical Yearbook of Transportation-1976, MOT, Korea, p. 125.
(3) Statistical Yearbook of Transportation-1982, MOT, Korea, p. 164.
(4) Mission to Korea.

KOREA

HIGHWAY SECTOR PROJECT

Forecast for Domestic Passenger Transport (1980-86)

Sectors	1980	% Share	Growth	1981	% Share	Growth	1982	% Share	Growth	1983	% Share	Growth	1984	% Share	Growth	1985	% Share	Growth	1986	% Share	Growth	1982-86 Average growth	1986-80 Multiplier
Passenger ('000)																							
Total	8,544,916	100.0	5.4	9,108,880	100.0	6.6	9,864,917	100.0	8.3	10,733,030	100.0	8.8	11,634,603	100.0	8.4	12,600,275	100.0	8.3	13,633,597	100.0	8.2	8.40	1.60
Railways	430,773	5.0	1.7	470,754	5.2	9.3	523,873	5.3	11.3	585,856	5.5	11.8	650,931	5.6	11.1	721,065	5.7	10.8	793,702	5.8	10.1	11.01	1.84
Subways	65,076	0.8	(2.1)/a	102,200	1.1	37.0	113,515	1.2	11.1	181,405	1.7	59.8	363,905	3.1	100.6	805,555	6.4	121.4	962,140	7.1	19.4	56.59	14.78
Highways	8,039,006	94.1	5.6	8,525,291	93.6	6.0	9,216,447	93.4	8.1	9,954,056	92.7	8.0	10,607,368	91.2	6.6	11,060,434	87.8	4.3	11,863,642	87.0	7.3	6.83	1.48
Maritime	8,580	0.1	8.2	9,006	0.1	5.0	9,329	0.1	3.6	9,772	0.1	4.7	10,253	0.1	4.9	10,826	0.1	5.7	11,441	0.1	5.7	4.90	1.33
Aviation	1,481	-	(18.3)	1,629	-	10.0	1,753	-	7.6	1,941	-	10.7	2,146	-	10.6	2,395	-	11.6	2,672	-	11.6	10.40	1.80
Pass-km (mln.)																							
Total	87,626	100.0	2.6	94,023	100.0	7.3	101,921	100.0	8.4	105,788	100.0	8.7	120,537	100.0	8.8	130,903	100.0	8.6	141,375	100.0	8.0	8.50	1.61
Railways	21,640	24.7	1.2	23,401	24.9	8.1	25,654	25.2	9.6	28,177	25.5	9.8	31,004	25.7	10.0	33,958	25.9	9.5	36,990	26.1	8.9	9.59	1.71
Subways	926	1.1	2.4	1,362	1.4	47.1	1,517	1.5	4.4	2,227	2.0	46.8	4,084	3.4	83.4	8,162	6.2	99.9	9,745	6.9	19.4	48.22	10.52
Highways	64,131	73.1	3.3	68,247	72.6	6.4	73,669	72.3	7.9	74,210	71.5	7.5	84,172	69.8	6.3	87,391	66.8	3.8	93,115	65.9	6.5	6.41	1.45
Maritime	401	0.5	3.9	426	0.5	6.2	443	0.4	4.0	464	0.4	0.7	489	0.4	5.4	516	0.4	5.5	549	0.4	6.4	5.20	1.37
Aviation	528	0.6	(17.0)	587	0.6	11.2	638	0.6	8.7	710	0.6	11.3	788	0.7	11.0	876	0.7	11.2	976	0.7	11.4	10.70	1.85

/a Figures in brackets ( ) indicate negative growth.

Source: "Draft" for preparation of 5th Five Social and Economic Plan (Transport Sector). August 1981, MOT, Korea, p. 17.

September 1982

KOREA

HIGHWAY SECTOR PROJECT

Forecast for Domestic Freight Transport (1980-86)

Sectors	1980	% Share	Growth	1981	% Share	Growth	1982	% Share	Growth	1983	% Share	Growth	1984	% Share	Growth	1985	% Share	Growth	1986	% Share	Growth	1982-86 Average growth	1986-80 Multi-plier
Tons ('000)																							
Total	172,776.8	100.0	(18.4) /a	182,279.4	100.0	5.5	194,856.0	100.0	6.9	208,691.3	100.0	7.1	223,717.4	100.0	7.2	240,048.7	100.0	7.3	257,812.0	100.0	7.4	7.18	1.49
Railways	49,008.0	28.4	(3.7)	51,225.0	28.1	4.5	53,680.0	27.5	4.8	56,161.0	26.9	4.6	58,916.0	26.3	4.9	61,933.0	25.8	5.1	65,386.0	25.4	5.6	5.00	1.33
Highways	104,526.0	60.3	(26.1)	110,826.0	60.8	6.0	119,573.0	61.4	7.9	129,391.0	62.0	8.2	139,995.0	62.6	8.2	151,495.0	63.1	8.2	163,870.0	63.5	8.2	8.14	1.37
Maritime	19,230.0	11.1	-	20,215.0	11.1	5.1	21,589.0	11.1	6.8	23,124.0	11.1	7.1	24,790.0	11.1	7.2	26,603.0	11.1	7.3	28,537.0	11.1	7.3	7.14	1.48
Aviation	12.8	-	(7.9)	13.4	-	4.7	14.3	-	6.7	15.3	-	7.0	16.4	-	7.2	17.7	-	7.9	19.0	-	7.3	7.23	1.48
Tons-km (mln.)																							
Total	23,186.1	100.0	(8.3)	24,322.3	100.0	4.9	25,853.8	100.0	6.0	27,457.2	100.0	6.5	29,242.7	100.0	6.5	31,171.5	100.0	6.7	33,354.0	100.0	6.9	6.52	1.44
Railways	10,798.0	46.6	(2.6)	11,267.0	46.3	4.3	11,756.0	45.5	4.3	12,329.0	44.9	4.9	12,938.0	44.3	4.9	13,603.0	43.6	5.1	14,357.0	43.1	5.5	4.97	1.33
Highways	4,920.0	21.2	(36.4)	5,235.0	21.6	6.4	5,780.0	22.3	9.0	6,246.0	22.8	9.4	6,818.0	23.3	9.7	7,461.0	23.9	9.4	8,153.0	24.4	9.3	9.26	1.66
Maritime	7,463.0	32.2	(0.7)	7,815.0	32.1	4.7	8,312.0	32.2	6.4	8,876.0	32.3	6.8	9,480.0	32.4	6.8	10,100.0	32.5	6.9	10,836.0	32.5	7.0	6.75	1.45
Aviation	5.1	-	2.0	5.3	-	3.9	5.8	-	9.4	6.2	-	4.9	6.7	-	8.1	7.5	-	11.9	8.0	-	6.7	8.58	1.57

/a Figures in brackets ( ) indicate negative growth.

Source: "Draft" for preparation of 5th Five Social and Economic Plan (Transport Sector). August 1981, MOT, Korea, p. 18.

September 1982

Table 4.3

KOREA

HIGHWAY SECTOR PROJECT

Comparison of Investment Plans (1977-81 and 1982-86)
(Billion won)

Transport investment	The Fourth Plan (1977-81) /a /c				The Fifth Plan (1982-86) /b			
	Investment requirements				Investment requirements			
	Domestic capital	Foreign capital (US$ mln)	Total	Composition ratio (%)	Domestic capital	Foreign capital (US$ mln)	Total	Composition ratio (%)
Railway	289.9 (719.0)	231.7 (574.6)	402.1 (997.2)	14.5	894.3	715.6	1,330.8	13.4
Highway	1,141.0 (2,829.7)	174.9 (433.8)	1,225.6 (3,039.5)	44.0	3,568.9	245.8	3,718.8	37.4
Road /d	373.1 (925.3)	174.9 (451.2)	457.8 (1,135.3)	16.4	1,175.0	220.8	1,309.7	13.2
Vehicles /e	741.2 (1,838.2)	- (-)	741.2 (1,838.2)	26.6	2,307.6	-	2,307.6	23.2
Others	26.6 (66.0)	- -	26.6 (66.0)	1.0	86.3	25.0	101.5	1.0
Ports and ships	557.4 (1,382.4)	902.3 (2,237.7)	994.1 (2,465.4)	35.7	1,693.2	1,576.9	2,655.1	26.7
Ships	358.8 (889.8)	773.6 (1,918.5)	733.3 (1,818.6)	26.3	1,228.6	1,365.2	2,061.4	20.7
Ports and facilities	200.6 (497.5)	128.7 (319.2)	260.8 (646.8)	9.4	464.5	211.7	593.7	6.0
Aviation	51.4 (127.5)	15.5 (38.4)	58.9 (146.1)	2.1	175.4	687.0	594.5	6.0
Subway	54.1 (134.2)	97.0 (240.6)	101.0 (250.5)	3.6	1,324.5	509.8	1,635.0	16.5
Waterway	1.9 (4.7)	- -	1.9 (4.7)	0.1	5.0	-	5.0	-
Total	2,095.7 (5,197.5)	1,421.4 (3,525.1)	2,783.6 (6,903.4)	100.0	7,661.3	3,735.1	9,939.7	100.0
Total capital expenditure	14,188.0 (35,186.2)	10,000.0 (24,800.0)	19,028.0 (47,189.4)		59,000.0	23,673.4	72,100.0	
Total transport investment as % of total capital expenditure	14.8	14.2	14.6		13.0	15.8	13.8	

/a The Fourth Plan figures are in 1975 constant value.

/b The Fifth Plan figures are in 1980 constant value.

/c The figures in parentheses indicate the 1980 constant value.

/d Including construction, repair and loan repayment of national roads only.

/e Including new vehicles additional to the fleet and replacements for scrapped vehicles.

Note: GNP deflator: 1975 = 100, 1980 = 247.9.

Sources: (1) The Fourth Five-Year Economic Development Plan (1977-81), EPB, Korea, 1976, pp. 140-141, pp. 152-153.
(2) The Fifth Economic and Social Develpoment Five-Year Plan - Transport Part for Implementation (1982-86), MOT, Korea, October 1981, p. 51.
(3) Transport Part of the Investment Plan, EPB, Korea, October 12, 1981, pp. 17, 26, 8.

Table 4.4

KOREA

HIGHWAY SECTOR PROJECT

Fifth Five-Year Plan: Expenditures for Roads (1982-86)
(In 1980 prices)

	1982	1983	1984	1985	1986	Total		
	(W billion)					W bln.	US$ mln. /a	Qty. (km)
Central Government Financing								
Construction & Improvement								
Expressways (KHC) /b	38.5	52.3	17.4	37.8	45.4	291.4	477.7	360
National Highways	99.5	101.3	165.4	133.3	153.4	552.9	906.4	-
Paving	93.4	96.4	153.4	94.4	109.9	447.5	733.6	2,421
Widening	6.1	4.9	12.0	38.9	43.5	105.4	172.8	173
Bridges (length in m)	3.9	3.7	6.8	8.4	6.2	29.0	47.5	7,591
Provincial roads paving	2.9	2.9	2.6	9.4	8.0	25.8	42.3	82
Subtotal	144.8	160.2	192.2	188.9	213.0	899.1	1,473.9	-
Others								
National highway maintenance	28.6	31.6	37.1	43.5	50.1	190.9	313.0	-
Overhead & studies	10.5	10.7	12.3	14.4	7.6	55.5	91.0	-
Loan amortization	26.4	33.1	33.3	34.7	36.7	164.2	269.1	-
Subtotal	65.5	75.4	82.7	92.6	94.4	410.6	673.1	-
Total	210.3	235.6	274.9	281.5	307.4	1,309.7	2,147.0	-
Local government financing (including maintenance) /c	91.7	91.8	91.8	91.8	91.8	458.9	752.3	2,452
GRAND TOTAL	302.0	327.4	366.7	373.3	399.2	1,768.6	2,899.3	-

/a Exchange rate 1980: US$1 = W 610.
/b Excluding maintenance expenditures of KHC.
/c Includes provinces and counties but excludes cities and special cities estimated at W 1,665 billion.

Sources: MOC and MOHA.

September 1982

Table 4.5

KOREA

HIGHWAY SECTOR PROJECT

Fourth Five-Year Plan: Expenditures for Roads (1977-81)/a
(Won billion)

	1977	1978	1979	1980	1981	Total 1977-81	%
National & Express Highways							
Administration	9.8	12.2	16.6	24.8	35.8	99.2	5.2
Construction	80.9	70.0	105.0	117.4	180.1	553.4	28.8
Maintenance	21.0	25.7	43.4	55.5	76.6	222.2/b	11.6
Subtotal	111.7	107.9	165.0	197.7	292.5	874.8	45.6
Others							
Provincial, Gun (County) & City Roads							
Administration	0.7	0.8	1.9	2.8	2.8	9.0	0.5
Construction	44.9	32.9	51.5	92.1	56.5	277.9	14.5
Maintenance	2.6	3.1	6.1	14.6	15.5	41.9	2.2
Subtotal	48.2	36.8	59.5	109.5	74.8	328.8	17.2
Special Cities							
Administration	-	1.8	2.7	32.9	21.3	58.6	3.0
Construction	67.7	115.1	132.4	159.7	131.0	606.0	31.5
Maintenance	1.9	3.4	3.0	4.7	36.6	49.6	2.6
Subtotal	69.6	120.3	138.1	197.3	188.9	714.2	37.2
Total, Current Prices	229.5	265.0	362.6	504.5	556.2	1,917.8	100.0
Total, 1975 Prices /c	167.6	160.5	184.1	203.5	191.0	906.7	
Total, 1980 Prices /c	415.6	397.9	456.3	504.5	473.5	2,247.8	

/a Including MOC, KHC and Government.
/b Maintenance of KHC network amounted to W 124 billion or 56%.
/c GNP deflator: 1975 = 100, 1977 = 136.9, 1978 = 165.1, 1979 = 197.0, 1980 = 247.9, 1981 = 291.2.

Source: MOC and mission to Korea.

Table 4.6

KOREA

HIGHWAY SECTOR PROJECT

Expenditures on Roads (1962-81) /a
(million won)

	Total First Plan 1962-66	%	Total Second Plan 1967-71	%	Total Third Plan 1972-76	%	Total Fourth Plan 1977-81	%
Government Expenditures on National Highways/b								
Administration	74	1	946	1	5,887	2	99,241	8.2
Construction	3,811	53	89,022	72	179,424	66	553,388	46.0
Maintenance/c	193	3	1,448	1	11,479	4	222,087	18.5
Subtotal	4,078	57	91,416	74	196,790	72	874,716	72.7
Expenditures on Provincial Gun (County), and City Roads /d /e								
Administration	-	-	-	-	-	-	8,979	0.7
Construction	2,174	31	26,286	21	65,150	24	277,984	23.1
Maintenance /f	851	12	5,737	5	11,516	4	41,930	3.5
Subtotal	3,025	43	32,023	26	76,666	28	328,893/g	27.3
Total	7,103	100	123,439	100	273,456	100	1,203,609	100.0

/a At current prices.
/b Includes roads under the jurisdiction of KHC.
/c Does not include funds contributed by provinces for the maintenance of national highways.
/d Seoul City excepted in First to Third Plans, and Special Cities (Seoul, Busan, Daegu and Incheon) excepted in the Fourth Plan.
/e Includes Government grants.
/f Maintenance includes expenditures on gravelled national highways, estimated at up to 70% of the total except the value of voluntary labor provided for all by farmers until 1971.
/g Investments under the Fourth Plan for the Special Cities amount to an additional W 714.2 billion and would represent 37%, if taken into account, of total road expenditures.

Source: MOC, MOHA and mission to Korea.

Table 4.7

KOREA

HIGHWAY SECTOR PROJECT

Expenditures on Roads (1981)
(million Won)

	MOC /a	KHC /b	Local government /c	Total	%
Expressways					
Administration	-	4,178	-	4,178	
Construction	20,000	19,889	-	39,889	
Maintenance	-	37,551	-	37,551	
Total	20,000	61,618	-	81,618	14.7
National Highways					
Administration	30,691/d	-	898	31,589	
Construction	100,527	-	39,687	140,214	
Maintenance	32,596	-	6,431	39,027	
Total	163,814	-	47,016	210,830	37.9
Special City Roads /e					
Administration	-	-	21,299	21,299	
Construction	-	-	131,036	131,036	
Maintenance	-	-	36,605	36,605	
Total	-	-	188,940	188,940	34.0
Provincial Roads					
Administration	-	-	1,713	1,713	
Construction	2,719	-	26,686	29,405	
Maintenance	-	-	6,835	6,835	
Total	2,719	-	35,234	37,953	6.8
City Roads					
Administration	-	-	651	651	
Construction	-	-	14,206	14,206	
Maintenance	-	-	5,706	5,706	
Total	-	-	20,563	20,563	3.7
Gun Roads					
Administration	-	-	409	409	
Construction	-	-	12,935	12,935	
Maintenance	-	-	2,976	2,976	
Total	-	-	16,320	16,320	2.9
Total					
Administration	30,691	4,178	24,970	59,839	
Construction	123,246	19,889	224,550	367,685	
Maintenance	32,596	37,551	58,553	128,700	
Total	186,533	61,618	308,073	556,224	100.0

/a MOC.
/b KHC.
/c Nine provincial governments and four special cities.
/d Reimbursement cost W 24,190 million for previous loan is included.
/e Seoul, Busan, Daegu and Incheon special cities.

Source: MOC, MOHA, KHC and mission to Korea.

Table 4.8(a)

KOREA

HIGHWAY SECTOR PROJECT

Actual Highway Investment Plan: Expenditures for 1982-86
(1983 prices)

	1982 /a	1983	1984	1985	1986	1982-86	
			(Won million)			Won mln	US$'000
Bureau of Public Roads (BPR)							
Capital							
Expressways construction	39,486	54,989	93,282	9,299	9,938	206,994	265,794
National roads							
Paving	124,791	132,683	60,593	107,468	127,239	552,774	713,252
Upgrading	4,764	8,246	10,950	13,970	6,160	44,090	55,963
Widening to 4 lanes	4,500	7,819	15,691	47,324	50,602	125,936	158,224
Provincial roads paving	3,028	3,891	2,993	10,963	9,342	30,217	38,312
Bridge construction	7,179	6,268	7,945	9,750	7,231	38,373	49,248
Maintenance equipment	1,107	2,065	2,892	3,325	3,824	13,213	16,714
Subtotal	184,855	215,961	194,346	202,099	214,336	1,011,597	1,297,507
Recurrent							
National roads							
Paved							
Routine maintenance	17,159	15,352	22074	25,065	28,424	108,074	138,157
Periodic maintenance	11,091	9,888	12,843	15,777	19,056	68,655	87,799
Unpaved	2,049	3,092	4,193	4580	4,734	18,648	23,676
General administration	515	1,752	2,015	2,099	2,187	8,568	10,802
Subtotal	30,814	30,084	41,125	47,521	54,401	203,945	260,434
Other Expenditures							
Studies	763	1,385	3,631	4,122	4,682	14,583	18,365
Weigh bridges	96	223	245	270	296	1,130	1,430
Repayment of loan	26,298	35,011	38,730	40,327	42,692	183,058	233,519
Subtotal	27,157	36,619	42,606	44,719	47,670	198,771	253,314
Total	242,826	282,664	278,077	294,339	316,407	1,414,313	1,811,253
Korea Highway Corporation (KHC)							
Capital							
Expressway widening	2,738	17,173	55,454	69,756	68,762	213,883	267,843
Upgrading	5,170	7,938	8,493	10,604	14,225	46,430	58,961
Ancillary facilities	493	1,460	2,577	2,757	2,950	10,237	12,884
Equipment	1,478	2,332	2,494	2,669	2,856	11,829	15,050
Subtotal	9,879	28,903	69,018	85,786	88,793	282,379	354,738
Recurrent							
Routine maintenance	30,220	30,305	32,427	34,696	37,124	164,772	211,361
Periodic maintenance	14,291	13,164	14,657	14,424	12,795	69,331	89,216
Facilities	177	293	312	335	359	1,476	1,877
Administration	4,834	4,805	5,320	5,693	6,091	26,743	34,292
Subtotal	49,522	48,567	52,716	55,148	56,369	262,322	336,746
Other Expenditures							
Research and studies	188	247	440	952	1,411	3,238	4,081
Weigh bridges	162	130	325	325	325	1,267	1,613
Repayment of loan & tax, etc.	29,980	6,105	4,298	4,464	4,639	49,486	67,211
Subtotal	30,330	6,482	5,063	5,741	6,375	53,991	72,905
Total	89,731	83,952	126,797	146,675	151,537	598,692	764,389
Ministry of Home Affairs (MOHA)							
Capital							
Provincial roads - paving	107,200	80,000	3,600	35,800	35,800	262,400	347,143
County roads - paving	12,800	67,400	94,900	102,000	102,200	379,300	476,411
Maintenance equipment	-	13,100	11,300	-	-	24,400	30,500
City roads - paving	45,000	52,500	57,500	62,500	67,500	285,000	364,286
Special city roads - paving	160,000	160,000	160,000	168,000	172,000	820,000	1,053,571
Subtotal	325,000	373,000	327,300	368,300	377,500	1,771,100	2,271,911
Subtotal (exclude city roads)	120,000	160,500	109,800	137,800	138,000	666,100	854,054
Recurrent							
Provincial roads	12,600	15,900	20,200	24,800	25,100	98,600	125,500
County roads	5,300	5,600	10,800	31,200	31,200	84,100	106,071
City roads	9,500	10,300	11,300	12,200	13,200	56,500	72,321
Special city roads	61,300	140,000	112,500	157,700	180,700	652,200	826,196
Others							
Consultants' studies	3,100	4,400	5,000	-	-	12,500	16,179
Subtotal	91,800	176,200	159,800	225,900	250,200	903,900	1,146,267
Subtotal (exclude city roads)	21,000	25,900	36,000	56,000	56,300	195,200	247,750
Total	416,800	549,200	487,100	594,200	627,700	2,675,000	3,418,178
Total (Exclude City Roads)	141,000	186,400	145,800	193,800	194,300	861,300	1,101,804
National Geographic Institute (NGI)	-	-	1,425	-	-	1,425	1,781
Ministry of Transport (MOT)							
Assistance to road transport industry - terminals, etc.	-	14,380	16,350	15,080	8,690	54,500	68,125
Road safety	-	750	750	-	-	1,500	1,875
Studies on sector issues and multimodal projects	-	1,500	1,500	-	-	3,000	3,750
Total	-	16,630	18,600	15,080	8,690	59,000	73,750
GRAND TOTAL	749,357	932,446	911,999	1,050,294	1,104,334	4,748,430	6,049,353
GRAND TOTAL (Exclude City Roads)	473,557	569,646	570,699	649,894	670,934	2,934,730	3,752,979

/a Actual expenditure.

Notes: (1) These figures vary slightly from the figures shown in the Fifth Five-Year Plan which presently is being revised. The above figures are based on the expenditures proposed by the various agencies as of July 30, 1983.

(2) Exchange rate for 1982 estimated US$1 = Won 700 and for 1983 through 1986 at US$1 = Won 800.

Table 4.8(b)

KOREA

HIGHWAY SECTOR PROJECT

Actual Highway Investment Plan: Expenditures for 1982-86
(Current prices)

	1982 /a	1983	1984	1985	1986	1982-86	
	(Won million)					Won mln	US$'000
Bureau of Public Roads (BPR)							
Capital							
Expressways construction	39,486	54,989	96,780	10,346	11,774	213,375	273,770
National roads							
Paving	124,791	132,683	62,865	119,572	150,747	590,658	760,607
Upgrading	4,764	8,246	11,361	15,543	7,298	47,212	59,866
Widening to 4 lanes	4,500	7,819	16,279	52,654	59,951	141,203	177,308
Provincial roads paving	3,028	3,891	3,105	12,198	11,068	33,290	42,153
Bridge construction	7,179	6,268	8,243	10,848	8,567	41,105	52,663
Maintenance equipment	1,107	2,065	3,000	3,699	4,531	14,402	18,201
Subtotal	184,855	215,961	201,633	224,860	253,936	1,081,245	1,384,568
Recurrent							
National roads							
Paved							
Routine maintenance	7,159	15,352	22,902	27,888	33,676	116,976	149,284
Periodic maintenance	11,091	9,888	13,325	17,554	22,577	74,434	95,023
Unpaved	2,049	3,092	4,350	5,096	5,609	20,196	25,611
General administration	515	1,752	2,091	2,335	2,591	9,284	11,697
Subtotal	20,814	30,084	42,668	52,873	64,453	220,890	281,615
Other Expenditures							
Studies	763	1,385	3,767	4,586	5,547	16,048	20,197
Weigh bridges	96	223	254	300	351	1,224	1,547
Repayment of loan	26,298	35,011	40,182	44,869	50,580	196,940	250,871
Subtotal	27,157	36,619	44,203	49,755	56,478	214,212	272,615
Total	232,826	282,664	288,504	327,488	374,867	1,516,347	1,938,798
Korea Highway Corporation (KHC)							
Capital							
Expressway widening	2,738	17,173	57,534	77,612	81,466	236,523	296,143
Upgrading	5,170	7,938	8,810	11,798	16,853	55,571	64,137
Ancillary facilities	493	1,460	2,674	3,068	3,495	1,189	14,075
Equipment	1,478	2,332	2,588	2,970	3,384	12,751	16,202
Subtotal	9,879	28,903	71,606	95,448	105,198	306,034	390,557
Recurrent							
Routine maintenance	30,220	30,305	33,643	38,604	43,983	176,755	226,340
Periodic maintenance	14,291	13,164	15,207	16,049	15,159	73,869	94,888
Facilities	177	293	324	373	425	1,592	2,021
Administration	4,834	4,805	5,520	6,334	7,216	28,709	36,750
Subtotal	49,522	48,567	54,694	61,360	66,782	280,925	359,999
Other Expenditures							
Research and studies	188	247	457	1,059	1,672	3,622	4,562
Weigh bridges	162	130	337	362	385	1,376	1,749
Repayment of loan & tax, etc.	29,980	6,105	4,459	4,967	5,496	51,007	69,112
Subtotal	30,330	6,482	5,253	6,388	7,553	56,005	75,423
Total	89,731	83,952	131,553	163,196	179,534	642,964	825,979
Ministry of Home Affairs (MOHA)							
Capital							
Provincial roads - paving	107,200	80,000	3,735	39,832	42,414	273,181	360,619
County roads - paving	12,800	67,400	98,459	113,488	121,082	413,229	518,822
Maintenance equipment	-	13,100	11,724	-	-	24,824	31,030
City roads - paving	45,000	52,500	59,656	69,539	79,971	306,666	391,369
Special city roads - paving	160,000	160,000	166,000	186,921	203,778	876,699	1,124,446
Subtotal	325,000	373,000	339,574	409,780	447,245	1,894,599	2,426,286
Subtotal (exclude city roads)	120,000	160,500	113,918	153,320	163,496	711,234	910,471
Recurrent							
Provincial roads	12,600	15,900	20,958	27,593	29,737	106,788	135,735
County roads	5,300	5,600	11,205	34,714	36,964	93,783	118,176
City roads	9,500	10,300	11,724	13,574	15,639	60,737	77,617
Special city roads	61,300	140,000	116,719	175,461	214,086	707,565	895,403
Others							
Consultants' studies	3,100	4,400	5,188	-	-	12,688	16,413
Subtotal	91,800	176,200	165,794	251,342	296,426	981,561	1,243,344
Subtotal (exclude city roads)	21,000	25,900	37,350	62,307	66,701	213,259	270,324
Total	416,800	549,200	505,368	661,122	743,671	2,876,160	3,669,630
Total (Exclude City Roads)	141,000	186,400	151,269	215,627	230,197	924,493	1,180,795
National Geographic Institute (NGI)	-	-	1,478	-	-	1,478	1,848
Ministry of Transport (MOT)							
Assistance to road transport industry - terminals, etc.	-	14,380	16,963	16,778	10,296	58,417	73,021
Road safety	-	750	778	-	-	1,528	1,910
Studies on sector issues and multimodal projects	-	1,500	1,556	-	-	3,056	3,820
Total	-	16,630	19,297	16,778	10,296	63,001	78,751
GRAND TOTAL	739,357	932,446	946,200	1,168,584	1,308,368	5,099,950	6,515,006
GRAND TOTAL (Exclude City Roads)	463,557	569,646	592,101	723,089	794,894	3,148,283	4,026,171

/a Actual expenditure.

Notes: (1) These figures vary slightly from the figures shown in the Fifth Five-Year Plan which presently is being revised. The above figures are based on the expenditures proposed by the various agencies as of July 30, 1983.
(2) Price inflation estimated at 7.5% for 1984, 7% for 1985 and 6% for 1986.
(3) Exchange rate for 1982 estimated US$1 = Won 700 and for 1983 through 1986 at US$1 = Won 800.

KOREA

HIGHWAY SECTOR PROJECT

Summary of Highway Investment Plan: Capital Expenditures for 1982-86 (Excludes City Roads)
(1983 prices)

	1982 /a		1983		1984		1985		1986		Total	
	Won mln	US$'000	Won mln	US$'000	Won mln	US$'000	Won mln	US$'000	Won mln	US$'000	Won mln	US$'000
Bureau of Public Roads (BPR)	184,855	264,079	215,961	269,951	194,346	242,933	202,099	252,624	215,336	267,920	1,011,597	1,297,507
Korea Highway Corporation (KHC)	9,879	14,113	28,903	36,129	69,018	86,273	85,786	107,233	88,793	110,991	282,379	354,739
Ministry of Home Affairs (MOHA)	120,000	171,429	160,500	200,625	109,800	137,250	137,800	172,250	138,000	172,500	666,100	854,054
National Geographic Institute (NGI)	-	-	-	-	1,425	1,781	-	-	-	-	1,425	1,781
Ministry of Transport (MOT)	-	-	16,630	20,788	18,600	23,250	15,080	18,850	8,690	10,863	59,000	73,751
Total	314,734	449,621	421,994	527,493	393,189	491,487	440,765	550,957	450,819	562,274	2,020,501	2,581,832
Estimated Volume of Physical Work (km)												
Bureau of Public Roads (BPR)												
National expressways		-		-		175.20		-		8.20		183.40
National highways												
Paving		-		547.00		165.20		420.00		561.00		1,693.00
Upgrading		-		9.00		16.00		18.00		8.00		51.00
Widening to 4 lanes		11.50		10.00		10.00		48.00		86.00		165.50
Provincial roads		30.50		31.00		-		24.00		27.00		112.50
Bridge construction		1.39		1.29		1.26		3.71		1.73		9.39
Korea Highway Corporation (KHC)												
Expressway widening		-		2.50		19.00		62.00		75.10		158.60
Ministry of Home Affairs (MOHA)												
Provincial roads paving		508.00		330.00		144.00		143.00		143.00		1,268.00
County roads paving		78.00		330.00		496.00		510.00		511.00		1,925.00
Total		629.39		1,260.79		1,026.66		1,228.71		1,421.03		5,566.39

/a Actual expenditure.

Notes: (1) These figures vary slightly from the figures shown in the Fifth Five-Year Plan which presently is being revised. The above figures are based on the expenditures proposed by the various agencies as of July 30, 1983.
(2) Exchange rate for 1982 estimated US$1 = Won 700 and for 1983 through 1986 at US$1 = Won 800.

KOREA

HIGHWAY SECTOR PROJECT

Summary of Highway Investment Plan: Capital Expenditures for 1982-86 (Excludes City Roads)
(Current prices)

	1982 /a		1983		1984		1985		1986		Total	
	Won mln	US$'000	Won mln	US$'000	Won mln	US$'000	Won mln	US$'000	Won mln	US$'000	Won mln	US$'000
Bureau of Public Roads (BPR)	184,855	264,079	215,961	269,951	201,634	252,042	224,860	281,075	253,936	317,420	1,081,246	1,384,567
Korea Highway Corporation (KHC)	9,879	14,113	28,903	36,129	71,606	89,508	95,448	119,310	105,198	131,498	311,034	390,558
Ministry of Home Affairs (MOHA)	120,000	171,429	160,500	200,625	113,918	142,397	153,320	191,650	163,497	204,371	711,235	910,472
National Geographic Institute (NGI)	-	-	-	-	1,478	1,848	-	-	-	-	1,478	1,848
Ministry of Transport (MOT)	-	-	16,630	20,788	19,298	24,122	16,778	20,973	10,296	12,869	63,002	78,752
Total	314,734	449,621	421,994	527,493	407,934	509,917	490,406	613,008	532,927	666,158	2,167,995	2,766,197
Estimated Volume of Physical Work (km)												
Bureau of Public Roads (BPR)												
National expressways		-		-		175.20		-		8.20		183.40
National highways												
Paving		-		547.00		165.00		420.00		561.00		1,693.00
Upgrading		-		9.00		16.00		18.00		8.00		51.00
Widening to 4 lanes		11.50		10.00		10.00		48.00		86.00		165.50
Provincial roads		30.50		31.00		-		24.00		27.00		112.50
Bridge construction		1.39		1.29		1.26		3.71		1.73		9.39
Korea Highway Corporation (KHC)												
Expressway widening		-		2.50		19.00		62.00		75.10		158.60
Ministry of Home Affairs (MOHA)												
Provincial roads paving		508.00		330.00		144.00		143.00		143.00		1,268.00
County roads paving		78.00		330.00		496.00		510.00		511.00		1,925.00
Total		629.39		1,260.79		1,026.46		1,228.71		1,421.03		5,566.39

/a Actual expenditure.

Notes: (1) These figures vary slightly from the figures shown in the Fifth Five-Year Plan which presently is being revised. The above figures are based on the expenditures proposed by the various agencies as of July 30, 1983.
(2) Price inflation estimated at 7.5% for 1984, 7% for 1985 and 6% for 1986.
(3) Exchange rate for 1982 estimated US$1 = Won 700 and for 1983 through 1986 at US$1 = Won 800.

KOREA

HIGHWAY SECTOR PROJECT

Road User Charges (1972-81)
(W million)

Revenue	Third FYP 1972	1973	1974	1975	1976	1972-76	Fourth FYP 1977	1978	1979	1980	1981	1977-81
National Taxes												
Fuel taxes	27,717	36,582	83,717	95,016	114,874	357,906	133,082	120,536	210,606	362,714	356,124	1,183,062
Gasoline tax	(19,593)	(25,821)	(57,236)	(60,026)	(72,185)	(234,861)	(94,149)/a	(104,209)/a	(184,352)/a	(310,394)/a	(290,122)/a	(983,226)/a
Diesel tax	(8,124)	(10,761)	(26,481)	(34,990)	(42,689)	(123,045)	(38,933)/a	(16,327)/a	(26,254)/a	(52,320)/a	(66,002)/a	(199,836)/a
Transport tax	16,000	18,801	13,484	16,868	21,262	86,415	15,054 /b	-	-	-	-	-
Commodity tax /c	3,535	6,613	7,499	11,764	16,642	46,053	9,330 /b	28,279	35,798	20,600	19,184	128,245
Subtotal	47,252	61,996	104,700	123,648	152,778	490,374	157,466	148,815	246,404	383,314	375,308	1,311,307
Local Taxes												
Vehicle tax (incl. surcharge)	7,191	7,866	12,016	12,353	14,137	53,563	17,900	26,518	51,416	60,866	61,014	217,714
License fee /d	1,661	1,804	1,784	2,092	2,388	9,729	3,949	7,735	7,845	8,340	8,665	36,534
Acquisition tax /d	-	1,622	2,643	3,708	4,636	12,609	6,143	15,388	21,110	19,393	19,005	81,039
Subtotal	8,852	11,292	16,443	18,153	21,161	75,901	27,992	49,641	80,137	88,599	88,684	335,287
Tolls	4,995	6,276	6,887	10,189	14,531	42,878	17,915	25,608	39,242	45,411	59,585	187,761
Total	61,099	79,564	128,030	151,990	188,470	609,153	203,373	224,064	366,017	517,324	523,577	1,834,355
Overall expenditures on roads /e	68,300	68,000	83,800	149,400	145,900	515,400	229,470	265,040	362,571	504,560	561,453	1,923,054

/a Special excise tax excluding Value Added Tax (VAT).
/b These taxes were incorporated in the newly adopted Value Added Tax from July 1, 1977 when the Korean Tax system was changed.
/c Estimated 10% of total commodity tax.
/d Revenues were combined prior to 1973. Both license fee and acquisition tax figures are estimates of the portion of the revenues from these taxes attributable to road vehicles.
/e Economic Statistics Yearbook 1982, The Bank of Korea, Korea, pp. 86-87.

Sources: MOC, MOF and MOHA.

September 1982

KOREA

HIGHWAY SECTOR PROJECT

Pump Price of Major Petroleum Products in Korea (1980-83)
(Won/liter)

			Ex-refinery price				Wholesale price			Retail price		
			Ex-refinery price	Tax /a	Price	Tax rate (%)	Margin	Price	Margin rate (%)	Margin	Price	Margin rate (%)
Premium gasoline	1980	NOV	321.28	499.62	820.90	60.9	23.15	844.05	2.7	35.95	880.00	4.1
	1981	APR	-	-	944.04	-	-	-	-	-	1,010.00	-
	1982	MAR	391.64	609.05	1,000.69	60.9	22.52	1,023.21	2.2	36.79	1,060.00	3.5
	1983	FEB	377.59	453.11	830.70	54.5	22.52	853.22	2.6	36.78	890.00	4.1
	1983	MAY	377.59	453.11	830.70	54.55	22.52	853.22	2.6	36.78	890.00	4.1
Regular gasoline	1980	NOV	249.91	380.43	630.34	60.4	17.23	657.57	2.6	22.43	680.00	3.3
	1981	APR	261.00	399.34	660.34	60.5	-	-	-	-	700.00	-
	1982	MAR	272.78	427.19	699.97	61.0	17.41	717.38	2.4	22.62	740.00	3.1
	1983	FEB	281.80	338.16	619.96	54.5	17.41	637.37	2.7	22.63	660.00	3.4
	1983	MAY	281.80	338.16	619.96	54.5	17.41	637.37	2.7	22.63	660.00	3.4
Kerosene	1980	NOV	180.12	22.84	202.96	11.3	9.30	212.26	4.4	13.74	226.00	6.1
	1981	APR	-	-	242.92	-	-	-	-	-	268.00	-
	1982	MAR	237.34	29.62	266.96	11.1	10.10	277.06	3.6	14.94	292.00	5.1
	1983	FEB	247.24	-	-	-	-	-	-	-	297.00	-
	1983	MAY	241.79	24.18	265.97	9.1	10.10	276.07	3.7	14.93	291.00	5.1
Diesel	1980	NOV	160.30	33.54	193.84	17.3	8.90	202.03	4.4	12.97	215.00	6.0
	1981	APR	197.00	34.97	231.97	15.1	-	-	-	-	255.00	-
	1982	MAR	211.25	43.68	254.93	17.1	8.94	263.87	3.4	14.13	278.00	5.1
	1983	FEB	216.60	-	-	-	-	-	-	-	283.00	-
	1983	MAY	211.60	42.10	253.70	16.6	9.17	262.87	3.5	14.13		5.1

/a Including excise tax, V.A.T., and transportation cost.

Sources: (1) A Study on the Improvement of Energy Price Structure in Korea, Dec. 1982, EPB, Korea, pp. 66-67.
(2) MOER and mission to Korea.

Table 4.11

Table 5.1

KOREA

HIGHWAY SECTOR PROJECT

Selected National and Provincial Roads: Traffic, Estimated Costs and Rate of Return

Sections	Length (km)	Actual/a 1982	Forecast 1987	1992	1997	2002	2006	Estimated cost (Won mln)	IRR (%)
Paving									
National Roads									
Daecheon-Dowha	8.3	1,291	2,300	3,620	5,700	8,970	12,900	6,560	119.0
Onyang-Pyeongtaeg	14.2	1,035	1,750	2,760	4,340	6,835	9,830	4,440	48.0
Seognam-Onyang	28.8	706	1,300	2,070	3,260	5,130	7,370	6,830	46.0
Icheon-Yeoju	15.9	1,098	1,250	1,980	3,120	4,910	7,060	4,270	45.5
Eumseong-Saenggeug	15.5	719	1,600	2,590	4,070	6,410	9,210	4,660	43.5
Cheonan-Byeongcheon	14.6	881	1,000	1,550	2,440	3,840	5,530	3,610	36.5
Siryangri-Yesan /b	15.6	1,163	1,400	2,160	3,390	5,340	7,680	4,791	35.0
Sinnam-Yanggu	25.2	443	750	1,210	1,900	2,990	4,300	9,350	33.0
Goryeong-Seongju	35.1	481	850	1,380	2,170	3,420	4,910	11,510	30.5
Cheongsong-Yeongyang	31.3	705	1,000	1,550	2,440	3,840	5,530	9,490	30.0
Subtotal	204.5							65,511	
Provincial Roads									
Geumcheon-Gyeongsan	20.4	1,201	2,000	3,110	4,890	7,690	11,060	5,380	50.0
Maehwa-Suweon	24.3	1,131	1,250	1,980	3,120	4,910	7,060	8,130	38.5
Subtotal	44.7							13,510	
Total	249.2							79,021	
Widening and Paving									
Donong-Dabnaeri	20.3	5,334	9,800	15,520	24,430	38,450	55,280	16,600	53.5
Daegu-Hayang /c	16.0	5,858	8,800	13,790	21,710	34,180	49,140	10,800	43.5
Onyang-Cheonan	11.3	7,778	14,200	22,410	35,280	55,540	79,850	7,990	37.5
Cheongju-Doan	21.2	3,829	7,700	12,070	19,000	29,900	42,990	16,290	35.0
Total	68.8							51,680	
Upgrading									
Tongri-Samcheong	43.7	550	400	640	1,000	1,580	2,270	16,840	23.0
GRAND TOTAL	361.7							147,541	

/a MOC counts.
/b The figures of AADT and IRR are of Haemi-Yesan section.
/c The figures of AADT and IRR are of Daegu-Yeongcheon section.

Source: Consultant BCEOM; Final Report, 1981, Volume One; and MOC.

August 1983

KOREA

HIGHWAY SECTOR PROJECT

Highway Design Standards

A. Expressway Standards

Design Speeds and Traffic Volume
(km/hr)

Topography	Design traffic volume (veh./day)		
	More than 30,000	30,000-10,000	Less than 10,000
Flat	120-100	100-80	80-60
Mountainous	100-80	80-60	60-50

Typical Geometric Design Standards

	Design speed (km/hr)			
	120	100	80	60
Radius of curvatures				
Desirable minimum (m)	710	460	280	150
Absolute minimum (m)	570	320	230	120
Maximum grade (%)	2	3	4	5
Length of vertical curve desirable minimum				
Crest (m)	11,000	6,000	3,000	1,400
Sag (m)	4,000	3,000	2,000	1,000
Minimum sight distance (m)	210	160	110	75
Bridge design loading	DB-24	DB-24	DB-24	DB-24

Source: KHC

B. Two-Lane National and Provincial Road Standards

A. Construction (including paving, mainly on new alignment): National Roads

Geometric Design Standards	Unit	Terrain: Flat	Rolling	Hilly	Mountainous /a
Design speed	km/h	120	100	70	50
Minimum radius of curvature	m	630	390	170	80
Maximum gradient	%	4	5	7	8
Roadway Features (all areas)					
Width of pavement	m	7.20			
Width of shoulders	m	3.00-1.75			
Width of right-of-way	m	30 minimum /b			
Structural Design Features (all areas)					
Axle load (pavement)	lbs	18,000 /c			
Bridge loading	-	DB-18, equivalent to AASHO H20-S-16			
Bridge widths (for new bridges over 100 m long) /d	m	10.70 (curb to curb)			
Vertical clearance (over roads)	m	4.80			

B. Paving (mainly on existing alignment, with limited improvement): National and Provincial Roads

Geometric Design Standards	Unit	Terrain: Flat Nat.	Flat Prov.	Rolling to hilly Nat.	Rolling to hilly Prov.	Mountainous /a Nat.	Mountainous /a Prov.
Design speed	km/h	80	60	60	50	40	30
Minimum radius of curvature:							
Desirable	m	300	140	175	95	80	35
Minimum	m	230	120	120	80	50	30
Maximum gradient	%	6	6	7	7	9	9
Desirable	%	4	4	5	5	7	7

Roadway Features (all areas)	Unit	Traffic levels aadt (estimated 10 years after completion of paving): Under 1,200 Type A	1,200-2,200 Type B	Over 2,200 Type C
Width of pavement	m	6.20	6.70	7.20
Width of shoulders	m	0.55-0.90	1.40-0.65	1.90-1.15
Width of right-of-way /e	m	25	25	25
Structural Design Features (all areas)				
Axle load (pavement)	lbs	18,000 /c		
Bridge loading	-	DB-18, equivalent to AASHO H20-S16		
Bridge widths (for new bridges) /f				
Rural areas	m	8.50 (curb to curb)		
Urban areas	m	10.00 (curb to curb)		
Vertical clearance (over roads)	m	4.80		

/a Design speeds and widths may be reduced and gradients increased on sections with exceptionally difficult terrain, as appropriate in each case.
/b Right-of-way width increased to 42 m where designed to accommodate ultimate construction of 4-lane divided highway.
/c Pavement designed for the projected number of repetitions of "equivalent 18,000 lbs axle loads."
/d Depending on traffic volume.
/e Right-of-way width reduced to 20 m where necessary to minimize demolition of property in urban areas.
/f Existing bridges retained unless significantly substandard in strength, size or alignment.

Source: MOC

C. County (Gun) Road Design Standards

Road type:	G1		G2		P1		P2		P3	
Terrain type:	F/H	M	F/H	M	F/H	M	F/H	M	F/H	M
Width (m)										
Roadway	5.0	5.0	6.5	6.5	6.5	6.0-6.5	7.5	7.0-7.5	7.7	7.0-7.5
Pavement	-	-	-	-	5.0	5.0	6.0	6.0	6.2	6.0
Shoulder	-	-	-	-	0.75	0.5-0.75	0.75	0.5-0.75	0.75	0.5-0.75
Right-of-way	>10.0	>10.0	>15.0	>15.0	15.0	>15.0	20.0	>20.0	25.0	>25.0
Design Speed (km/h)	40	30	40	30	40	30	50	30	60	30
Horizontal Alignment										
Normal crossfall	4	4	4	4	2.5	2.5	2.5	2.5	2.5	2.5
Maximum superelevation	8	8	8	8	7	7	7	7	7	7
Curve Radius										
Absolute minimum	50	25	50	25	50	25	80	25	125	25
Normal minimum	60	30	60	30	60	30	100	30	140	30
At minimum superelevation	200	120	200	150	200	150	300	150	350	150
Without superelevation	350	200	400	250	400	250	500	250	600	250
Vertical Alignment										
Maximum Gradient (%)										
Normal	-	10/a	-	8	-	8	-	7	-	7
Absolute	-	12/a	-	10/a	-	10	-	9	-	9
Curve Radius (m)										
Crest	700	300	700	500	700	500	1,000	700	1,500	900
Sag	500	250	500	300	500	300	800	300	1,000	500

/a Paving will be considered for slopes above 8%.

Source: MOHA

Table 5.3

KOREA

HIGHWAY SECTOR PROJECT

Cumulative Disbursement Schedule

IBRD fiscal year and quarter	Estimated cumulative disbursement	
	US$ million	%
1983/84		
March 31, 1984	-	-
June 30, 1984	20.0	9.0
1984/85		
September 30, 1984	-	-
December 31, 1984	50.0	22.0
March 31, 1985	-	-
June 30, 1985	100.0	43.0
1985/86		
September 30, 1985	-	-
December 31, 1985	120.0	52.0
March 31, 1986	-	-
June 30, 1986	150.0	65.0
1986/87		
September 30, 1986	-	-
December 31, 1986	180.0	78.0
March 31, 1987	-	-
June 30, 1987	200.0	87.0
1987/88		
September 30, 1987	-	-
December 31, 1987	230.0	100.0
March 31, 1988	-	-
June 30, 1988	-	-

Source: Bank staff.

January 1984

KOREA

HIGHWAY SECTOR PROJECT

Past Five-Year Transport Development Plans and Bank's Involvement (1962-81)

1. The First Plan (1962-66) devoted about half of transport investments to modernize and strengthen rail system capacity. Some 275 km of industrial track were built (Tonghae Puku line); the conversion from steam to diesel traction was started with large imports of locomotives and diesel rail cars; the fleet was modernized with large imports of passenger and freight cars while a large number were locally made. The Second Plan (1967-71), in contrast to the First, devoted about 60% of transport investments on highway improvement. Some 655 km of expressways were built (Seoul-Busan, Ulsan-Onyang, Seoul-Incheon and Daejon-Chonju) and the motor vehicles fleet increased by nearly 100,000 units. In the railway sector, 180 km of new tracks were constructed (Kyonggon line), and 50 km doubled-tracked (Honam line); the fleet continued to expand with very large imports of diesel locomotives, passenger and freight cars, while more were built locally and rehabilitated. In the maritime sector, 800,000 GT of ocean-going ships and 130,000 GT of coastal ships were added, while Busan port stevedoring facilities were expanded and Incheon and Ulsan ports were developed to accommodate foreign trade and to establish industrial coastal zones.

2. The Third Plan (1972-76) gave priority to the highway and maritime sectors which receive 47% and 28%, respectively, of transport investments. Some 490 km of two-lane high-speed highways were built (Chonju-Busan, Wonju-Gangreung), a national road maintenance organization was established and the motor vehicles fleet expanded further by 210,000 units. In the maritime sector, expansion of Busan and Mukho ports was started, while Incheon port was developed further with the help of the Asian Development Bank (ADB); the fleet was increased by some 1.3 million GT. In the railway sector, the line capacity increase continued through electrification of 320 km of heavy traffic industrial lines (Chungang, Taebaek and Yongdong), and about 100 km of the Seoul Metropolitan System (SMESRS); about 90 km of new tracks were laid including 9.5 km of the first subway line in Seoul. In the aviation sector, the international airports of Seoul Kimpo, Busan-Kimhae and Cheju were expanded while ten jet liners were imported.

3. The Fourth Plan (1977-81) directed investments at the consolidation of the basic transport infrastructure developed over the previous decade by completing missing links, while also starting to promote better efficiency in the operation of the transport system. The emphasis was placed on expenditures for maintenance and renovations rather than on investments for new facilities, with the major exception being a large-scale subway construction program designed to alleviate urban transport congestion in Seoul City. The basic highway network was completed by widening to 4 lanes the Masan-Busan expressway and constructing the Daegu-Masan 85 km two-lane expressway. A large-scale paving program for national roads was also started to bring the paved portion to 68%, a target that was not reached partly due to reclassification. In the railway sector, some 160 km of double tracking were

completed (Chungbuk and Gyeongbu lines) while large numbers of electric cars, diesel locomotives, passenger and freight cars and workshops were added. In the maritime sector, the first Busan container port and Mukho coal port were completed; and a second expansion of the Busan container area was started. Incheon expansion, started in 1974, was completed in 1978 with the assistance of ADB, through the addition of 20 deep-water berths, including 5 container berths and 4 breakwaters.

4. The past achievements under development plans in the transport sector are very impressive and evidenced by large networks and fleet expansions as well as modernization. However, funds expended under the national plans reflect only part of total investments in the transport sector. Local government investments, including those of provinces, counties, cities and special cities, are not included in the plans unless they are funded at least in part by the central budget. Omitting to take them into account would considerably distort the assessment of the real magnitude of Korea's progress. In particular, the four Special Cities (Seoul, Busan, Daegu and Incheon) road investment programs were not shown in the Fourth Transport Plan although with over W 700 billion at current prices (nearly US$1 billion), 80% of which was in Seoul City, they represented 37% of the country's overall road investment. In comparison, W 880 billion or 46% were spent on national and express highways and W 328 billion or 14% on provincial, county and city roads.

Performance Assessment

5. Broadly, the basic objectives of the transport development plans were met as the network expanded fast enough to accommodate economic growth. The general approach that gave priority to large investments to increase system capacity was the most appropriate. The traffic grew so fast that halfway measures, such as rehabilitation and improvement of the deficient network of the 1960s, would have been insufficient and short-sighted.

6. The highway development policy was geared to develop a network of roads to serve the short and medium distance traffic for which they have an economic advantage over the railways. The Road Plan developed in 1968, in consultation with the Bank, proposed a very ambitious program consisting of: (a) the development through 1986 of a network of about 4,000 km of trunk highways to form a grid of longitudinal and transversal axes linking the four major gate ports of Incheon, Busan, Mogpo and Mukho toward inland centers, and (b) the construction over a 10-year period of a 1,600 km two-lane expressway network designed on separate alignments from the old roads, that could be expanded when traffic volumes would require it. The program was 75% completed and was determinant in localizing industries around Seoul and in most provincial capitals, speeding the urbanization process as the population migrated more easily from rural areas. The voluntary delay in improving the secondary and tertiary networks was justified in view of the highway requirements of the industrialization policy.

7. Similarly, the railway investment policy was directed at strengthening its transport capacity for bulk freight and long distance passenger traffic where the railways have a comparative advantage. Investment in modernization, double tracking and electrification of the most heavily used freight line (14 million tons p.a.) enabled the railway to perform more efficiently and to cope with demand. In particular, it helped increase

express train traffic from 1 billion passenger-km in 1971 to 9 million in 1981, to make large profits. However, to keep freight or recover local passenger traffic that would be better handled by road transport, the railway attempted to compete by investing in improvements that were economically not so justified and had to apply a fares policy for ordinary trains that could not cover operating costs. Also the Government forced the railways to invest in infrastructure for other than strictly economic reasons such as double-tracking of the Chung-Buk line.

8. Past investments, geared to the development of ports, including those of Busan, Incheon and Ulsan, were necessary to cope with the large increase of ocean-going freight and to attract heavy industries to coastal areas. Also, the Busan containerization program was effective in reducing handling costs and expediting flows of cargo, although custom clearances still impose lengthy transit delays. However, efforts were too restricted to the major ports. A national port development policy remains to be introduced to shape the future role, number and localization of lesser ports, particularly to support coastal shipping which has scope for much expansion, given the geography and political situation which make Korea a de facto island. Progress in the shipbuilding industry has been very instrumental in modernizing the domestic fleet, which has proven to be a source of foreign exchange earnings. An expansion of air transport was also timely in serving the many foreign and local businessmen who were the artisans of Korea's fantastic exports expansion that increased from 1962 to 1978 at an average of 27% p.a.

The Bank's Involvement

9. The Bank has played an active role in advising and assisting the Korean authorities in pursuing their transport objectives. Since 1962, the Bank Group has assisted the KNR through seven railway projects amounting to US$434 million. The first five projects have been satisfactorily completed and a sixth is almost fully disbursed. Bank-supported investments have concentrated on improved capacity and service for long distance passenger and bulk cargo transport. The Bank has also maintained an active dialogue on the railway's financial situation, investment plans, level and structure of tariffs. After some deterioration in the 1970s, Government agreed to implement a financial recovery plan for KNR as part of the Seventh (ongoing) Railway Project. Discussions of a revised plan, following the severe downturn of the economy in the early 1980s, are continuing. Meanwhile, a Coal and Cement Distribution Project which was recently appraised would strengthen the capacity of the railways, ports and inland terminals to cope with the expected increase in transport of these commodities, resulting partly from large coal imports substituting for oil.

10. Since 1969, the Bank has financed five highway projects and a pre-investment credit totalling US$465 million which have had a major impact in assisting Government with the improvement and expansion of the national and provincial road networks and with institution-building in the MOC. Significant policy changes, relating to the highway sector, which were effected through the highway projects, include the adoption of more appropriate road standards, revisions of regulations governing vehicle weights and dimensions, and a modified government policy on toll roads. The MOC's organization to maintain the national road network was established and strengthened through the provision of technical assistance and road maintenance equipment. Korean

consulting firms have benefitted through their association with foreign consultants on the design of road projects.

11. Substantial assistance has also been extended for port development. In part related to Korea's export drive, ports are seriously congested, particularly at Busan, the biggest port. Containerization was introduced in Busan with the assistance of the Bank under two port projects totalling US$147 million; the Saudi Fund for Development participated with the Bank in the financing of the first Busan Port Project. A third port project designed as a subsector loan is now being considered to further improve container handling capacity at Busan and for supporting other maritime plans.

KOREA

HIGHWAY SECTOR PROJECT

Transport Policy Letter and Action Plan

February 20, 1984

Mr. A. W. Clausen
President
The International Bank for Reconstruction and Development
Washington D.C. U.S.A.

I am writing in connection with the proposed loan for the Highway Sector Project to inform the International Bank for Reconstruction and Development of our development policies in the transport sector and the actions the Government has already taken or proposes to take to increase further the efficiency of the road transport system. The current goal is to respond more effectively to the transport demand growth by intensifying the utilization of the existing transport network and by providing selective expansion of the network to avoid bottlenecks. Central to these objectives would be allowing more flexibility in the transport regulatory and pricing system to promote better response of transport operators to the needs of users. The selective liberalization of the transport system would promote the national economy by reducing transport costs and conserving fuel, and would contribute to improving the balance of payments.

Our Fifth Five-year Economic and Social Development Plan (1982-86) has as important objectives the promotion of national development by giving priority to economic stability, production efficiency and balanced regional development. In this context, the transport sector development goals are to:

(a) selectively increase transport capacity by modernizing equipment and optimizing investments in the sector;

(b) enhance transport efficiency by improving intermodal traffic allocation and conserving energy; and

(c) strengthen maintenance activities.

The proposed Project will assist the Government in meeting the objectives mentioned above in the highway sector through implementation of a program of actions which is proposed in detail in the attachment to this letter. This program is directed at solving issues in the areas of: (1) road investment planning; (2) energy efficiency in transport; and (3) regulation and pricing in road transport. The program of actions will be executed under the responsibility of the Economic Planning Board.

With best regards,

Sincerely yours,

Kim Hung Ki
Vice Minister
Economic Planning Board
Republic of Korea

PROPOSED GOVERNMENT ACTION PLAN UNDER THE HIGHWAY SECTOR PROJECT

1. The Government of the Republic of Korea (GOK) has requested the International Bank for Reconstruction and Development for assistance in financing of highway improvement covering national, provincial and county roads under a highway sector loan.

2. The GOK understands that the basis for the highway sector loan would be the investment program covering capital and recurrent expenditures as presently planned for the years 1983 through 1986 by the agencies concerned and that the loan would assist in expenditures during the years 1984, 1985 and 1986.

3. In support of the proposed project, the GOK proposes the following program of actions whose main objective would be to increase efficiency in the transport sector and would be specifically directed at solving issues in three major areas:

(a) Road investment planning;

(b) Energy efficiency in transport; and

(c) Regulation and pricing in road transport.

4. The GOK believes that such objective is appropriate given that the economic growth forecast in the Fifth Five-Year Economic and Social Development Plan (FFYP) is more modest than in past plans and that the budgetary limitations would require an even more careful assessment and selection of future investments in the transport sector.

A. Road Investment Planning

5. Although some success has been achieved in planning, overall planning of the transportation system still requires improved interagency coordination, wider application of modern planning and economic appraisal techniques, and a greater capacity to undertake appropriate longer term pre-investment studies. Unless such improvements are made, transport investments may result in costly duplication of capital investment and an imbalance in the allocation of funds for maintenance. Accordingly, investments in roads need to be coordinated closely among the agencies responsible for the various parts of the road system, namely the Ministry of Construction (MOC) and the Ministry of Home Affairs (MOHA), and with proposed investments in the other modes.

(a) Highway Planning. Under the program of actions, the GOK would first establish a system/1 under which all investments in the highway sector are planned on an integrated and sound economic basis and second, make its best efforts to ensure that funds appropriated for each road agency support closely the priorities indicated in the integrated Highway Investment Plan./2

Specific Actions:

(i) The planning system, project evaluation criteria, and integrated highway investment plan being prepared under Loan 2228-KO would be adopted by end-1984 after Government review and consultation with the Bank. Under the planning system, a well-integrated highway investment plan would be prepared by 1986, as part of the transport sector plan to be included in the Sixth Five-Year Economic and Social Development Plan 1987-1991;

(ii) Establish, by end-1984, a system for reviewing annually investment proposals and related budget plans for all expressway, national, provincial and county road construction or improvement - whether financed directly from the budget, as for the Bureau of Public Roads (BPR), or otherwise as in the case of MOHA and the Korea Highway Corporation (KHC) - so that they reflect the integrated plan and economic priorities established by Government;

(iii) Carry out, starting in 1984, a study of the existing arrangements for channelling revenues to the different agencies responsible for maintaining and improving the road network, for the purpose of developing appropriate recommendations for securing a better balance between the economically justified needs of each agency and the road user charges which are allocated to them. (This study will be part of the road user charges study referred to below C(10)(c)).

(iv) The Government would make its best efforts to ensure that from 1986 onward the annual appropriation of funds for maintenance would reflect the amounts proposed in the Highway Investment Program prepared under the system defined in (a) above.

/1 The system will be identified in the Integrated Road Investment Planning Study being done under Loan 2228-KO.

/2 This would include investments in road construction and improvement by MOC (BPR and KHC) and MOHA.

(v) MOC would prepare a maintenance management system during 1984, to be implemented during 1985, to ensure a more cost effective maintenance of the paved road network by relating the level of maintenance to the traffic volume on the paved roads.

(b) Highway Planning in Relation to Other Modes. Under the program of actions, the GOK would strengthen the existing system under which highway investment plans are reviewed to ensure the coordination of highway investments with investments in other modes of transport.

Specific Actions:

(i) Strengthen the Economic Planning Board's (EPB) capability to review, evaluate and coordinate major transport investment proposals; to facilitate this, the Government would establish by mid-1986 procedures for comparing investment alternatives between modes.

(ii) In order to carry out (i) above, GOK would identify by mid-1984 the shortfall of staff skilled in planning and economic evaluation and prepare, by end 1984, a program for upgrading the capability of existing staff.

B. Energy Efficiency in Transport

6. Energy is a key factor in development for Korea and the large petroleum imports are a major cause of Korea's balance of payments deficit. About 20% of petroleum consumption is in the transport sector. While efforts have been directed to modify energy consumption patterns so as to conserve energy in the sector, the potential for savings is far from being realized. With proper steps taken under a coordinated program, substantial savings of energy are possible. There is need to focus institutional responsibility, increase energy efficiency of automotive components (engines, transmissions, etc.) manufactured in Korea to suit the operating conditions and to improve operations of road, rail and maritime transport services.

7. Under the program of actions proposed below, the GOK would develop further and expand the effectiveness of the present program to increase energy efficiency in the transport sector.

Specific Actions:

(a) By March 31, 1984, the Ministry of Energy and Resources (MOER) will start effectively to coordinate, manage and monitor actions for conservation of energy use in the transport sector. MOER would:

(i) require the agencies with responsibility in the sector to submit a plan which would establish its energy conservation policy and goal for the period 1984-86. Such plans would cover, inter alia,

a. the promotion of energy efficiency in the bus and truck manufacturing industry;

b. a technological assessment of the potential in Korea for installing appropriate fuel conversation devices and adopting appropriate techniques for trucks and locomotives;

c. driver training and public information programs for motor vehicle and railroad operators; and

d. the establishment of criteria and guidelines for the analysis of proposed investments by agencies in the transport sector to assess their impact on energy demand.

(ii) In order to prepare and carry out these actions, studies and seminars will be conducted with the assistance of experts as may be necessary.

(iii) Monitor achievement of targets through periodic reviews.

(b) MOER, with assistance from other appropriate agencies and experts, would be responsible to develop and maintain a program to train sufficient staff in government agencies concerned with transport in the techniques of energy conservation analysis as applied to the transport sector. A plan for such training would be prepared by July 1984, and the training program commenced by March 1985.

C. Regulation and Pricing in Road Transport

8. Korea transport services by common carriers are closely controlled by Government through regulations which:

(a) limit entry into the industry and restrict provision of services, and

(b) set the prices that may be charged.

9. The present system tends to limit competition in commercial road transport as the market is shared by existing operators who are not challenged by new-comers. As a result, the still unregulated fleet of trucks owned by private industry has expanded dramatically, but at a substantial economic cost as the private fleet is normally not well used as it cannot get the return loads that are restricted to commercial carriers. The problem raised by the present system of regulation and pricing (including a taxation differential which does not charge the heavier vehicles according to the damage they cause to the roads) results in a lower efficiency than what could be achieved through more competition and more appropriate pricing. Further, the consolidation of freight to be transported in large trucks on long distance is not organized systematically due to the lack of road and intermodal freight terminals.

Specific Actions

10. To review the situation with a view to finding appropriate solutions to meet the transport demand effectively at least cost, the Government will carry out three studies based on terms of reference to be agreed between the Government and the Bank. A Steering Committee will be established for the studies with representatives of concerned agencies under the chairmanship of EPB. The following studies will be included in the project:

(a) Trucking Industry Regulations. To assess the impact of current road transport regulations on the cost of transport services and energy use, and propose removal of unnecessary regulations to open up competition on a selective basis. This study will be carried out by a team of consultants which will include experts experienced in regulatory practices. It will be started by July 1, 1984, and completed by March 31, 1985, under the supervision of the Land Transport Bureau of the Ministry of Transport.

(b) Freight Terminals and Related Services. To identify the potential for improving efficiency in transport through the use of road and intermodal freight terminals. This study will be carried out by a team of consultants which will include experts experienced in trucking industries in foreign countries. It will be started by February 1, 1985, and completed by October 31, 1985, under the supervision of the Transport Coordination Bureau of the Ministry of Transport.

(c) Road User Charges. To study and identify the most appropriate method of apportioning the costs of highways among the users and channelling revenues to concerned agencies. This study will be carried out by a team of consultants experienced in road user cost assessment. It will be started by May 1, 1984, and completed by December 31, 1984, under the supervision of MOC (BPR) with the support of the Economic Planning Board.

Kim Fung Ki
Vice Minister

Economic Planning Board
Republic of Korea

February 20, 1984

KOREA

HIGHWAY SECTOR PROJECT

STAFF APPRAISAL REPORT

Progress Reporting Requirements

1. Two types of progress reports would be submitted regularly: (i) Program Progress Reports and (ii) Sub-Project Progress Reports. Both EPB and MOT types of reports will be prepared by MOF in collaboration with the MOC, MOHA and MOT for information regarding the program or action to be implemented by them.

Program Progress Reports

2. Program Reports would be submitted semi-annually, commencing in 1984. These reports would indicate progress in implementing each major component of the Program and would contain the following information:

Component	Information Required
A. Road Paving/Improvement	For each class of road: /1
	(i) physical progress to date of report and during reporting period;
	(ii) comparison of physical progress with the implementation schedule;
	(iii) reasons for deviations from schedule and proposals for corrective action where appropriate;
	(iv) projections of likely progress in following reporting period;
	(v) expenditure to date of report and during reporting period;
	(vi) comparison of actual expenditure with program and reasons for any deviations, with particular attention to trends in unit costs; and

---

/a Expressway, National, Provincial and Country Roads.

(vii) projections of likely expenditure in following reporting period.

B. Road Maintenance

(i) list of routine and periodic maintenance work performed during the reporting period;

(ii) comparison of actual work with program schedule and reasons for deviations from schedule including proposals for corrective action;

(iii) work targets and projections of likely expenditure for the following reporting period.

C. Sub-Project Progress Reports

3. This report would be submitted at quarterly intervals, not later than one calendar month after the end of the period. The first report should cover the quarter ended June 30, 1984. This report should contain the following information on each sub-project being financed by the Bank:

Component	Information Required
Road Construction/Improvement	(i) The physical progress accomplished to date of report and during the reporting period;
	(ii) actual or expected deviations from the sub-project Implementation Schedule; /2
	(iii) actual and expected difficulties or delays and their effect on implementation and the actual steps taken or planned to overcome the difficulties and avoid delays;
	(iv) expected changes in the completion dates of the sub-projects;
	(v) matters which may affect the cost of the sub-projects;
	(vi) original estimated cost;

/2 Implementation Schedule for each sub-project would be submitted with the application for Bank to accept that sub-project for financing.

(vii) revised cost, if appropriate; and

(viii) actual expenditure;

(ix) projected expenditure;

(x) actual withdrawals and projected withdrawals from Loan Account for this sub-project.

D. Technical Assistance and Consultant Services

(i) Progress during reporting period in procuring these services; and

(ii) brief report describing and evaluating work performed by technical assistance experts and consultants during the reporting period.

E. Action Plan (Annex 2)

(i) Quarterly progress reports on implementation of the Action Plan would be prepared and submitted by the EPB, the first one covering the quarter ended June 30, 1984.

KOREA

HIGHWAY SECTOR PROJECT

PROGRESS REPORTING REQUIREMENTS

Monitoring Indices for Action Plan

Project component	Timing: Estimated	Timing: Actual	Time difference: Lag	Time difference: Lead	Reason for difference (if any)	Actions to be taken	Responsible agency
A. Coordinating Committee							
Establish interagency (MOHA,MOC,MOT,MOER,MCI, EPB) Coordinating Committee, chaired by EPB		11/14/83					EPB
B. Integrated Road Investment Planning (IRIP) /_1							
a. Highway Planning							
i. Adopt the IRIP system, plans and project evaluation criteria	By end-1984						EPB/MOC/MOHA
ii. Establish a function to annually review road investment proposals	By end-1984						EPB
iii. Prepare a management system for cost effective maintenance of paved road network	During 1984						MOC
iv. Implement maintenance management system	During 1985						MOC
v. Use IRIP system to prepare roads program for inclusion in 6-FYDP	By start 1986						EPB/MOC
vi. Ensure annual appropriations for maintenance reflects IRIP proposals for each agency	From 1986						EPB/MOC/MOHA
b. Highway Planning in Relation to Other Modes							
i. Identify shortfall of staff skilled in planning	By mid-1984						EPB
ii. Carry out a program for upgrading staff capabilities	By end-1984						EPB
iii. Strengthen system for coordinating investment alternatives between modes	By mid-1986						EPB
C. Energy Efficiency in Transport							
a. Start transport energy conservation actions	By 3/31/1984						MOER,(MCI/MOT)
i. Require the agencies to submit plans	Annually						"
ii. Periodic reviews	Quarterly						"
iii. Studies and seminars	Semi-annually						"
b. Prepare a plan for continued training of sufficient staff in conservation techniques	7/31/1984						MOER
c. Commence energy conservation training program in transport sector	By March 1985						MOER
D. Regulation and Pricing in Road Transport							
a. Trucking Industry Regulations Study	7/1/84-3/31/85						LTB of MOT
b. Freight terminals and Related Services Study	2/1/85-10/31/85						TCB of MOT
c. Road User Charges Study	5/1/84-12/31/84						MOC/EPB
d. Exchange views on study findings and set implementation schedules	By 3 months after each study submission						EPB/MOC/MOT

/_1: The IRIP system is to be defined in an ongoing study financed under Loan 2228 and directed by an MOC chaired committee.

12/15/83

ANNEX 4

KOREA

HIGHWAY SECTOR PROJECT

Selected Documents and Data Available in the Project File

A. General Reports

A.1. "The Fifth Five-Year Social and Economic Development Plan (1982-86)" dated December 1981, by Economic Planning Board.
A.2. "The Second Comprehensive National Physical Development Plan, 1982-1991", May 1982, Government of The Republic of Korea.

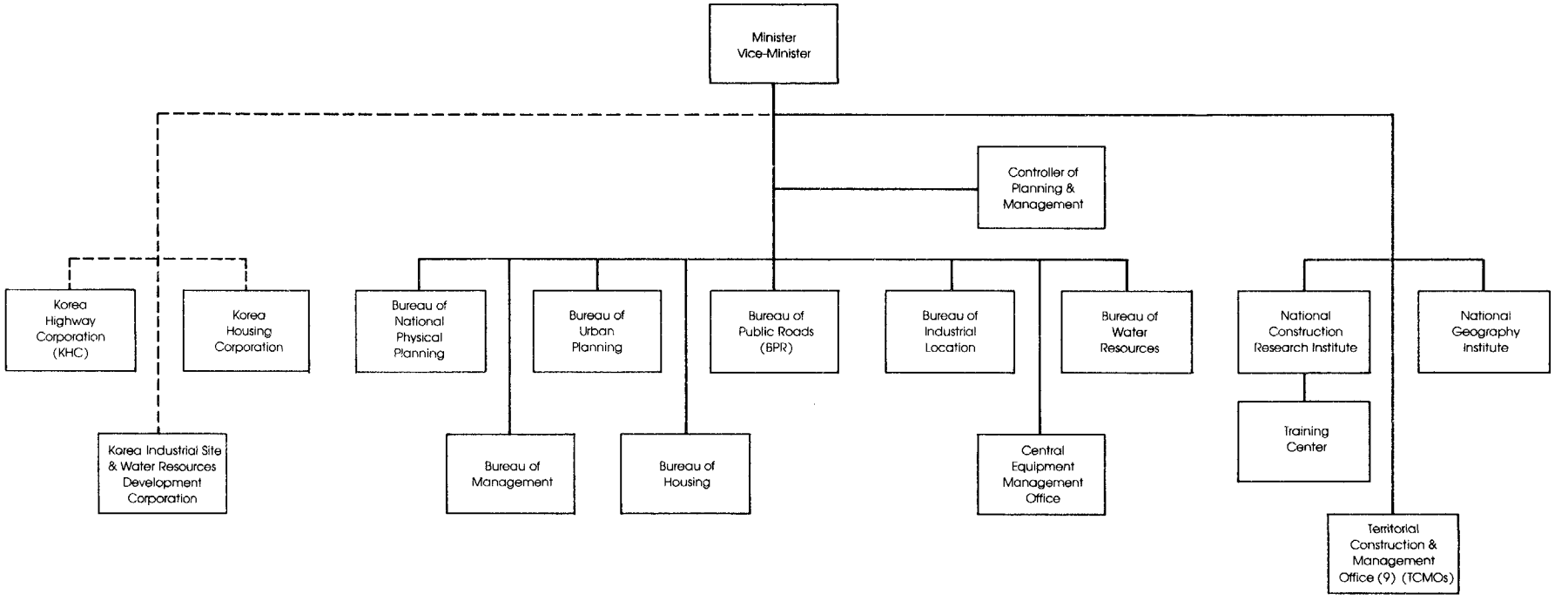
B. General Reports and Studies on the Sector or Subsector

B.1. "Transportation Sector Plan (1982-86)", dated December 1981, by Transportation Affairs Planning Group, MOT.
B.2. "KOREA - Transport Statistic" (1982), prepared by AEPT1, IBRD.
B.3. "KOREA - Transport Sector Issues Survey", Green Cover, April 21, 1983 prepared by AEPT1, IBRD.

C. General Reports and Studies Relating to the Project

C.1. "Study of National and Provincial Road Networks", dated November 28, 1981, by BCEOM (France).
C.2. "Gun Road Development Study", dated December 1981, by BCEOM (France) and Saman (Korea).
C.3. "Provincial and Gun road Maintenance Study", dated December 1981, by BCEOM (France) and Saman (Korea).

KOREA
HIGHWAY SECTOR PROJECT
Ministry of Construction: Organization

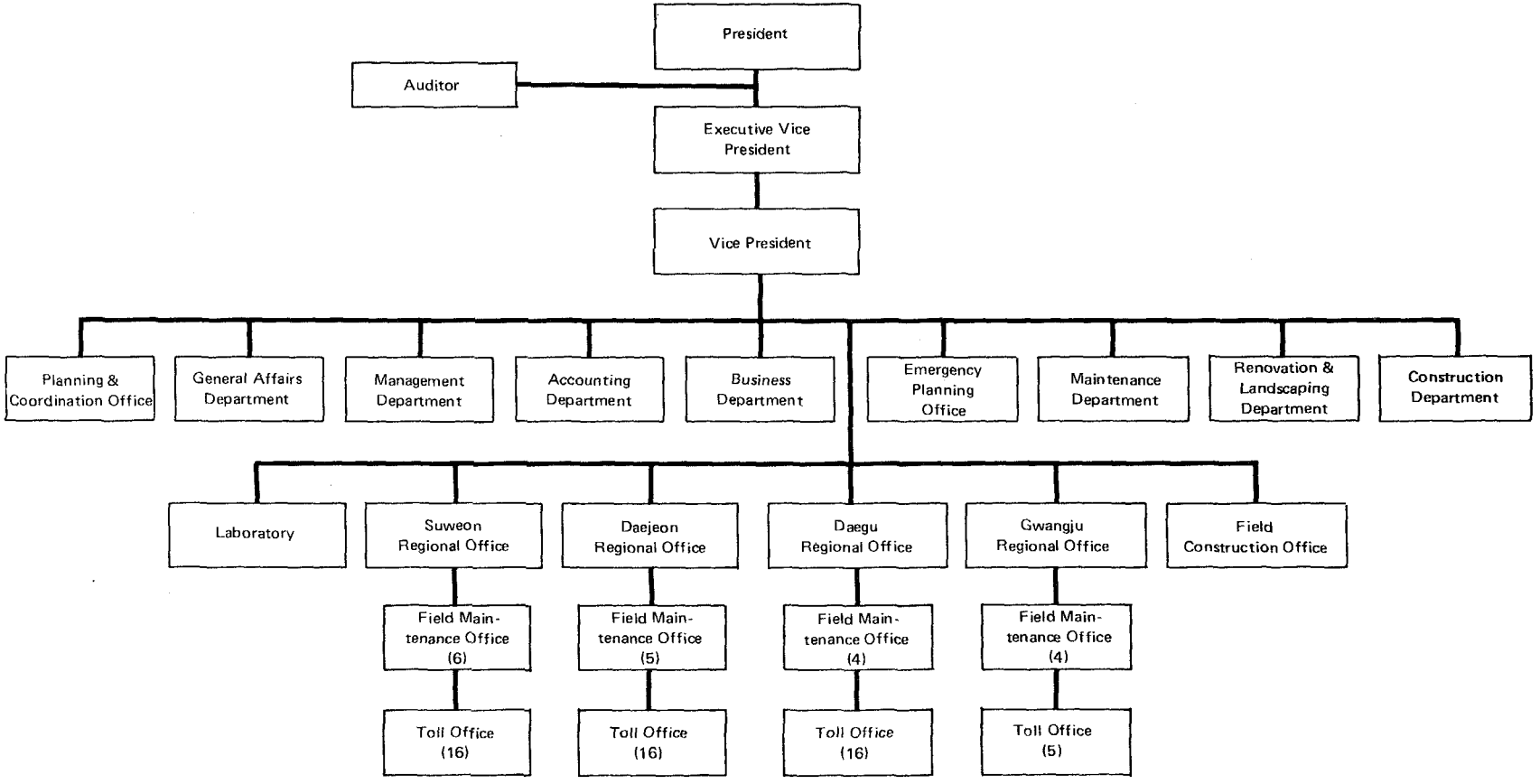


Source: Ministry of Construction

World Bank—25514

CHART 1

KOREA
HIGHWAY SECTOR PROJECT
Korea Highway Corporation: Organization

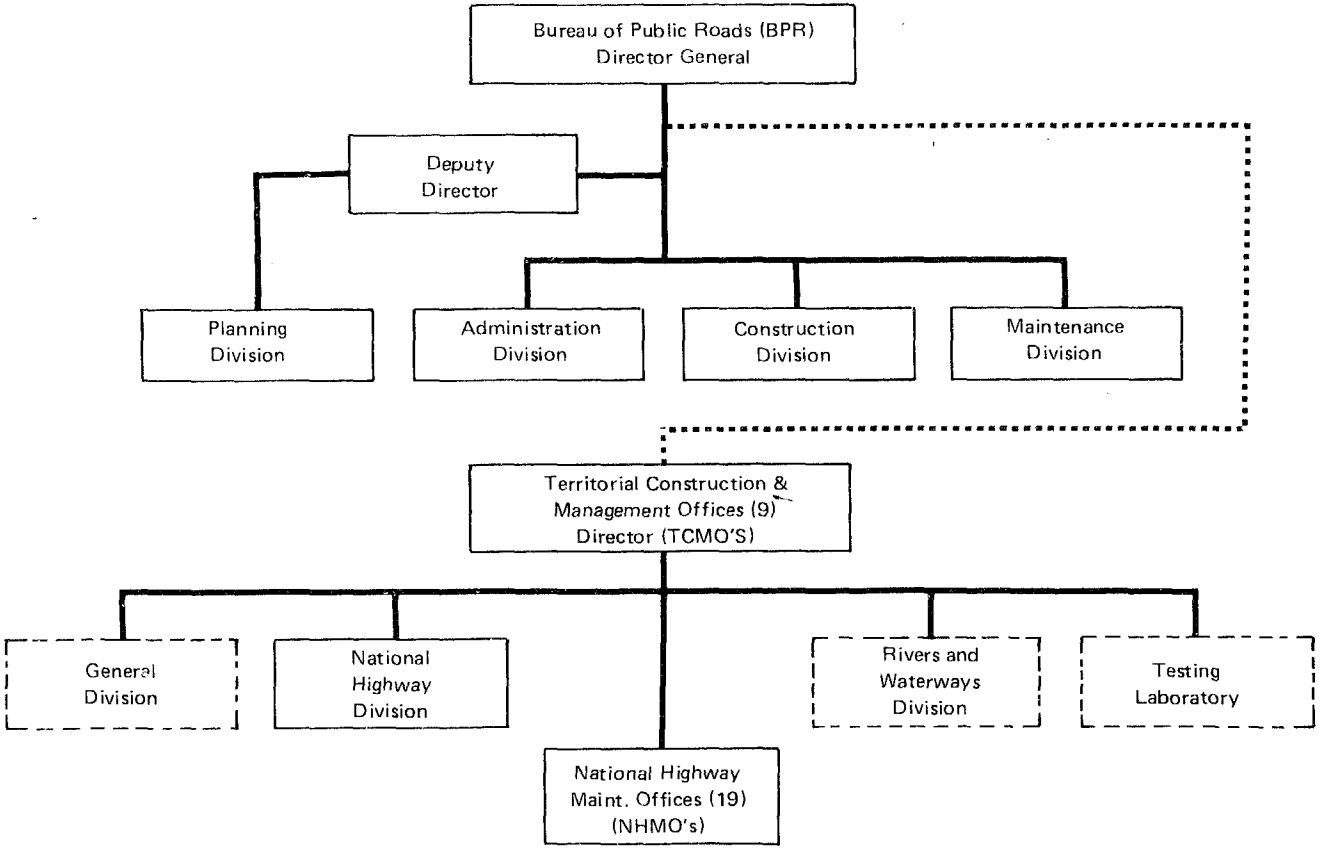


Source: Ministry of Construction

World Bank — 19016

CHART 2

KOREA
HIGHWAY SECTOR PROJECT
Bureau of Public Roads: Organization

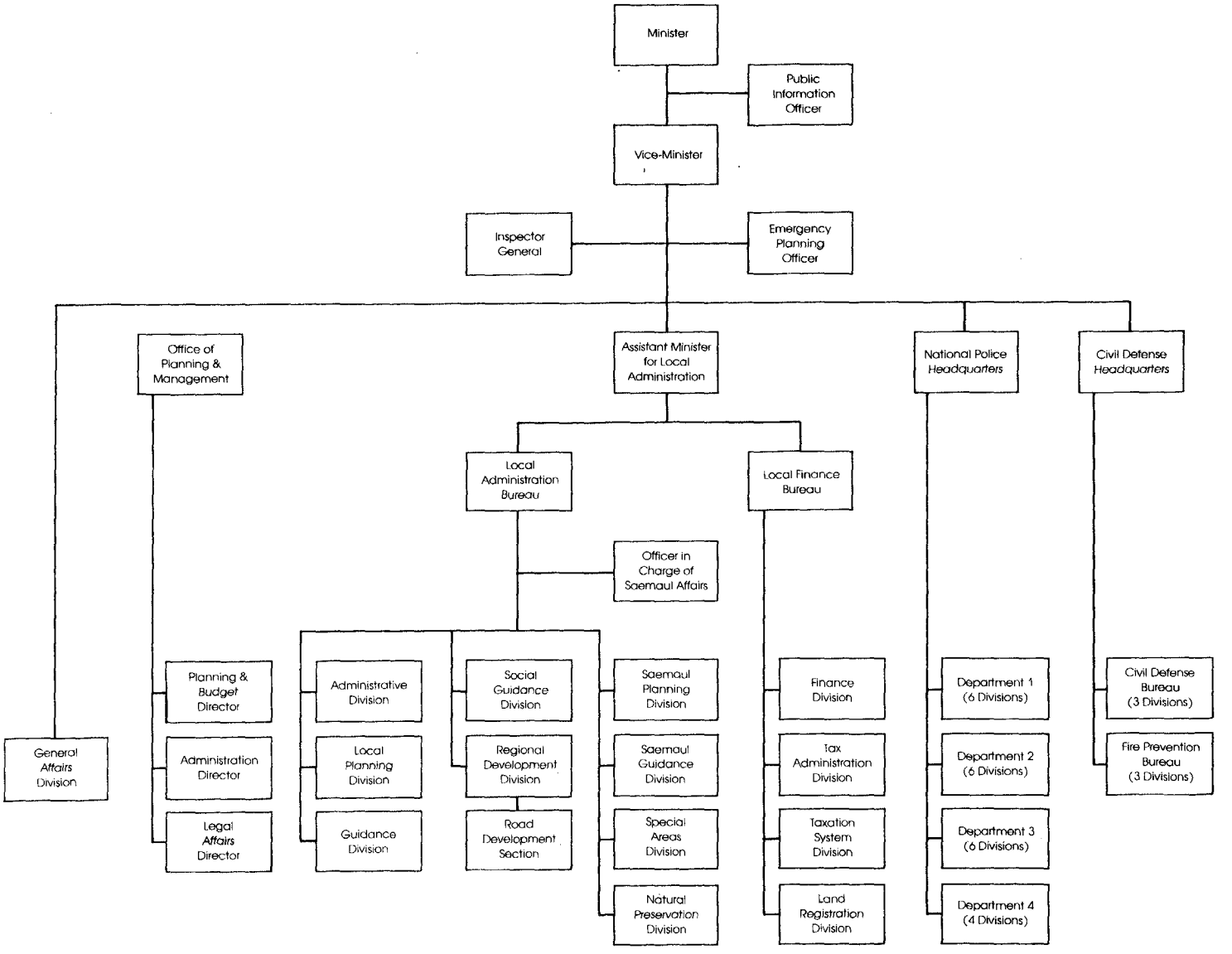


Source: Ministry of Construction

World Bank – 19015

CHART 3

KOREA
HIGHWAY SECTOR PROJECT
Ministry of Home Affairs: Organization



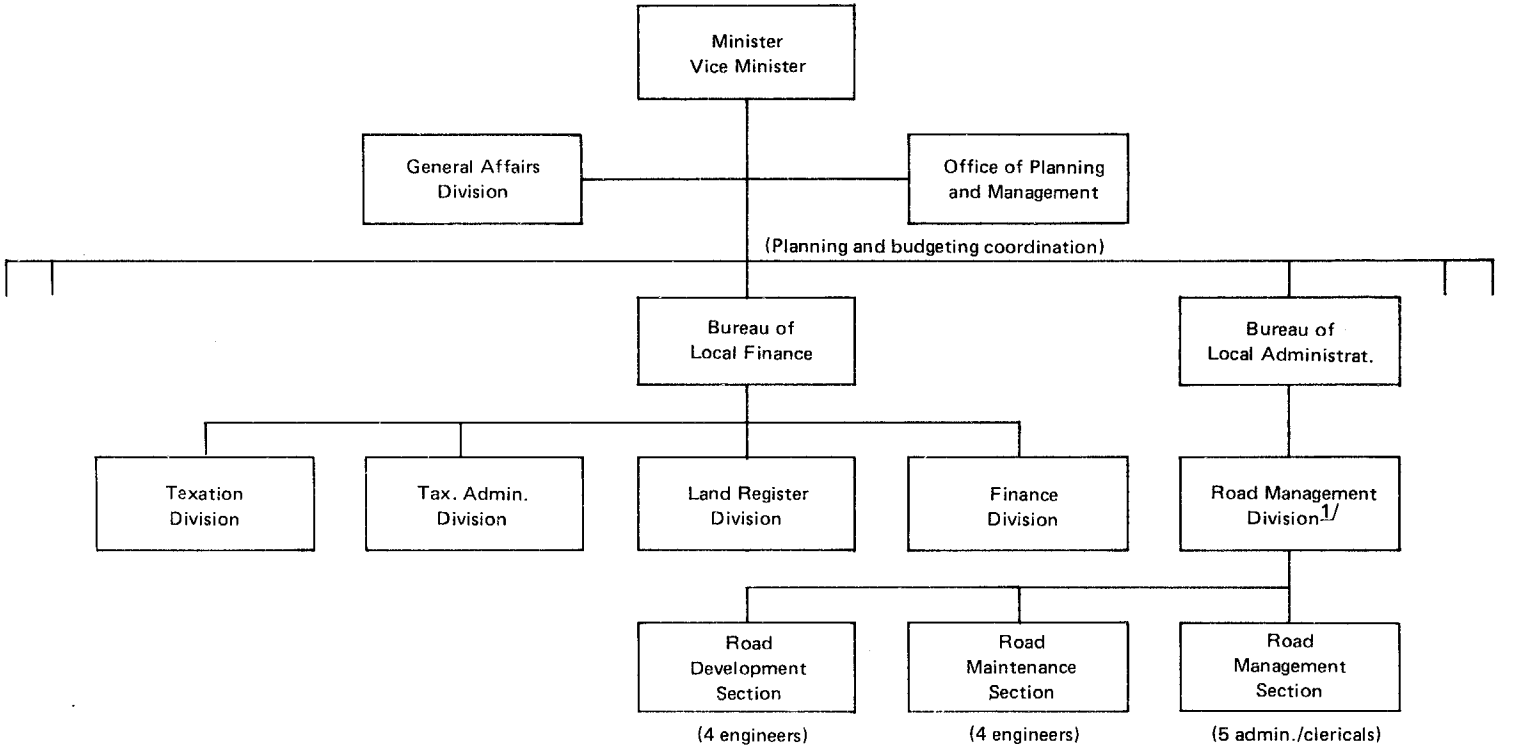
Note: The Road Development Section is to be upgraded to a Road Management Division — see Chart 5

Source: Ministry of Home Affairs
June 1982

World Bank—25513

CHART 4

KOREA
HIGHWAY SECTOR PROJECT
MOHA Organization for Road Management



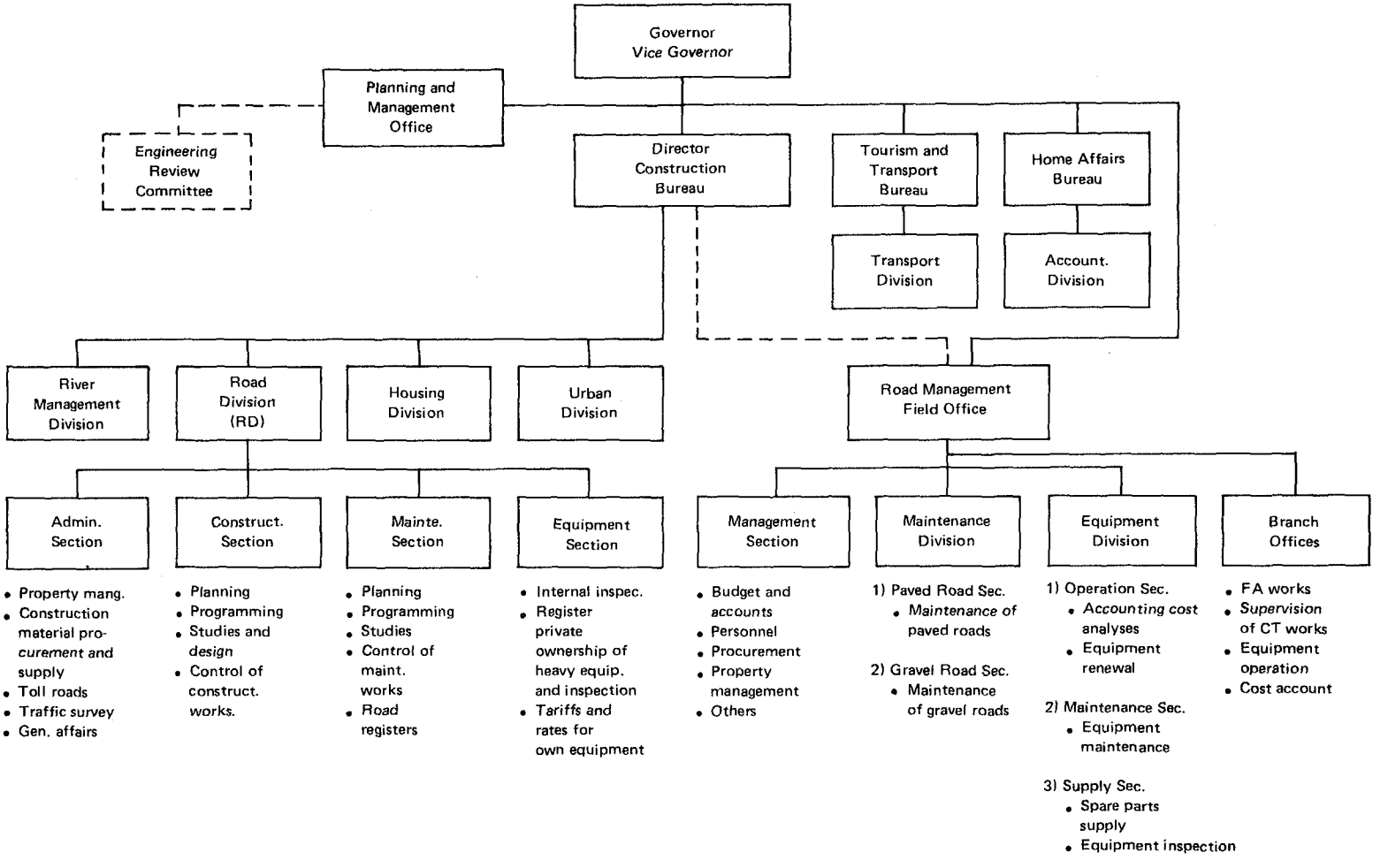
1/ Proposed

Source: Ministry of Home Affairs
June 1982

World Bank–24250

CHART 5

KOREA
HIGHWAY SECTOR PROJECT
Road Organization at Provincial Level

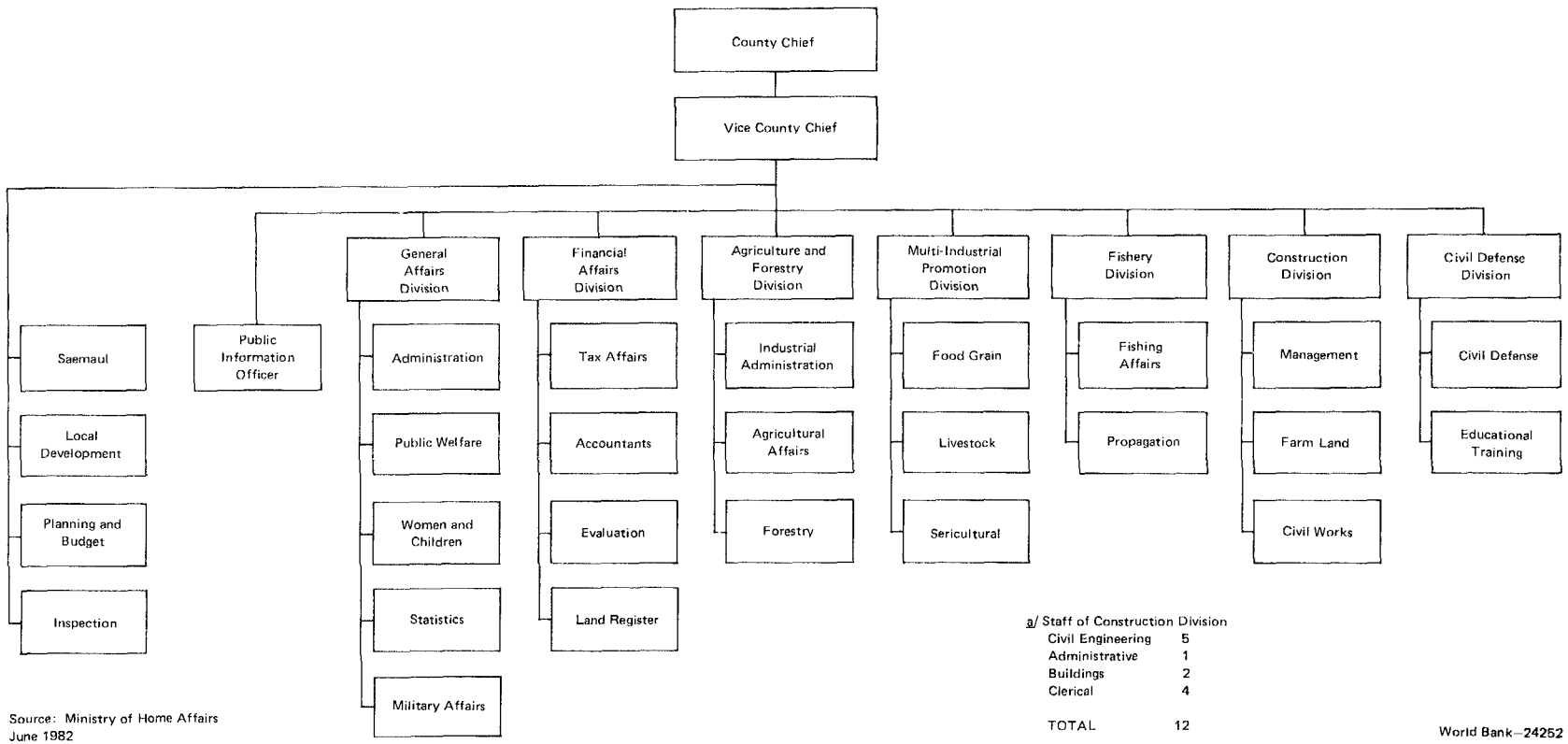


Source: Ministry of Home Affairs
June 1982

World Bank–24251

CHART 6

KOREA
HIGHWAY SECTOR PROJECT
A Typical County (Gun): Organization



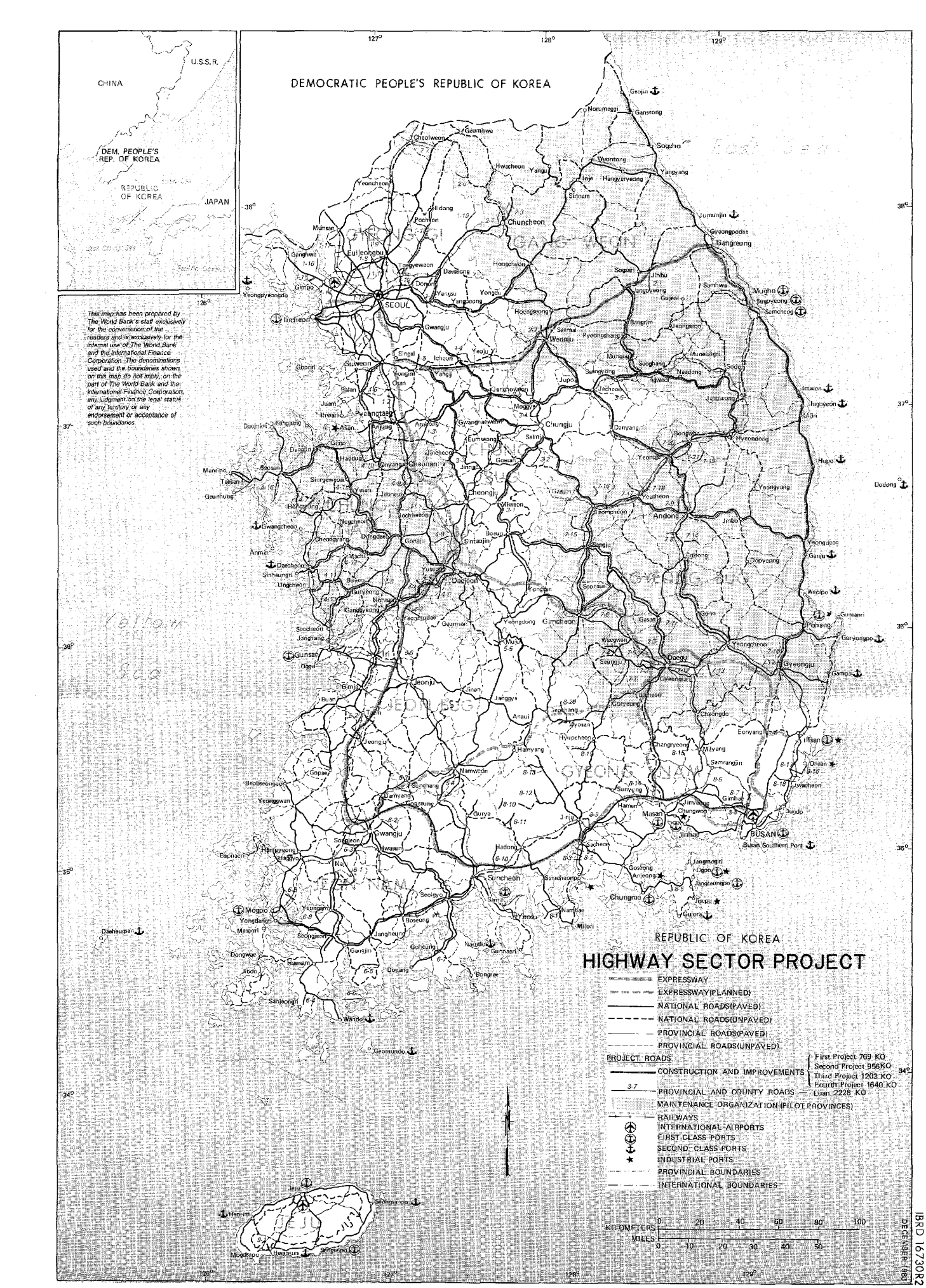
a/ Staff of Construction Division

Civil Engineering	5
Administrative	1
Buildings	2
Clerical	4
TOTAL	12

Source: Ministry of Home Affairs
June 1982

World Bank-24252

CHART 7


U.S.S.R.
CHINA
DEM. PEOPLE'S REP. OF KOREA
REPUBLIC OF KOREA
JAPAN
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA
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SEOUL
Incheon
Chuncheon
Wonju
Chungju
Andong
Daejeon
Gwangju
BUSAN
Busan Southern Port
Jeju
Cheongju
Jeonju
Mokpo
Yeosu
Pohang
Ulsan
Gyeongju
Gimcheon
Gunsan
Suncheon
Masan
Samcheok
Donghae
Sokcho
Gangneung
Wonsan
Hungnam
Nampo
Sinuiju
Kaesong
Haeju
Pyongyang
Hamhung
Chongjin
Rashin
Najin
Kimchaek
Hyesan
Manpo
Sinuiju
Pyongyang
Wonsan
Hamhung
Chongjin
Rashin
Najin
Kimchaek
Hyesan
Manpo
Yellow Sea
Sea of Japan
East China Sea
REPUBLIC OF KOREA
HIGHWAY SECTOR PROJECT
EXPRESSWAY
EXPRESSWAY(PLANNED)
NATIONAL ROADS(PAVED)
NATIONAL ROADS(UNPAVED)
PROVINCIAL ROADS(PAVED)
PROVINCIAL ROADS(UNPAVED)
PROJECT ROADS
CONSTRUCTION AND IMPROVEMENTS
First Project 769 KO
Second Project 956 KO
Third Project 1203 KO
Fourth Project 1640 KO
Loan 2228 KO
PROVINCIAL AND COUNTY ROADS
MAINTENANCE ORGANIZATION (PILOT PROVINCES)
RAILWAYS
INTERNATIONAL AIRPORTS
FIRST CLASS PORTS
SECOND CLASS PORTS
INDUSTRIAL PORTS
PROVINCIAL BOUNDARIES
INTERNATIONAL BOUNDARIES
KILOMETERS 0 20 40 60 80 100
MILES 0 10 20 30 40 50
IBRD 16730R2
DECEMBER 1983